V: 4-22-2013 Draft Permits Public Notice Date (TN0028827, TN0029718, and I0027278)

ry Davis
ıt: Tuesday, April 02, 2013 8:36 AM
Dorie Bolze [doriebolze@harpethriver.org]

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ase note that we have put the drafts for Franklin, Berry's Chapel, and Cartwright Ck on 4-22-2013 public notice. Please call : to discuss when you have a chance.
anks
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ry Davis
'EC - Division of Water Resources
5-532-0649

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om: Gary Davis
ınt: Tuesday, April 02, 2013 8:32 AM
ı: Hilty, Mark; Ring, Tyler; Bruce Meyer
:: Wade Murphy
ıbject: 4-22-2013 Draft Permits Public Notice Date (TN0028827, TN0029718, and TN0027278)

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DEC - Division of Water Resources
L5-532-0649

22-2013 Draft Permits Public Notice Date (TN0028827, TN0029718, and I0027278)

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ıt: Tuesday, April 02, 2013 8:32 AM

Hilty, Mark [mark.hilty@franklintn.gov]; Ring, Tyler [tylerlring@comcast.net]; Bruce Meyer [bmeyer@sheafferinternational.com]

Wade Murphy

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anks
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ry Davis
EC - Division of Water Resources
5-532-0649

:: Harpeth River water quality monitoring and technical advisory committee pproach -- for consideration with sewer permits

xandraewing@harpethriver.org

nt: Friday, April 05, 2013 3:47 PM

Gary Davis

Alan Schwendimann; Sherry Wang; Ming.Chen Shiao; Jimmy R. Smith; Wade Murphy; Vojin Janjic; Sandra Dudley; Jennifer Dodd; Michelle B. Walker; Dori Bolze [doriebolze@harpethriver.org]; Michelle Barbero [michellebarbero@harpethriver.org]

achments: 30759 Raleigh - Smith Cr 2~1.pdf (898 KB) ; MOA_NCDWQ and LNBA.pdf (1 MB)

Gary and TDEC Folks,

ank you for sending us the e-mail letting us know that you're intending to send out draft NPDES permits for the three permittees on the rpeth on 4/22. As you and Dorie discussed last week, here is the information she said we'd provide.

we've been investigating other models of collaborative watershed monitoring, we've come across some interesting examples in Colorado, arles River Watershed, Lower Neuse River Basin, Pacific Northwest region, and others. What all of these regions and watersheds have in mmon is that they are using a collaborative, "big tent" approach that makes use of a Technical Advisory Committee (TAC) to guide nitoring efforts by all parties. As an example, I'm attaching the permit from North Carolina's Neuse River Basin. The language in this rmit allows for entities to participate in a common monitoring program through membership in the state-sanctioned Lower Neuse Basin sociation (LNBA). The permit outlines the individual in-stream monitoring requirements, but states that these requirements are waived so ig as the Permittee maintains "full and active membership in the LNBA for the subject facility." See Part I, page 4 under Footnotes. We ought this might be useful to you as you draft the permit language. The LNBA acts as a version of the Technical Advisory Committee, iich we are suggesting as an approach for this watershed. I've also attached the MOA between State of NC Division of Water Quality and IBA, for you to refer to.

e would like to meet with you at your convenience to discuss all of this. Please let us know if we could set up a meeting soon. In the eantime, we will be making a presentation about some of these things at the AWWA conference on Monday at 3:30 at Vanderbilt Loew's in se any of you have the time or inclination to come down!

ianks and best regards,

indy

lexandra Ewing, PhD

ssociate Director

ARPETH RIVER WATERSHED ASSOCIATION

O. Box 1127, Franklin, TN 37065

reet Address:

15 Jamestown Park, First Floor

rentwood, TN 37027

Iobile: 615-481-0948

ffice: 615-790-9767, x232

tp://www.harpethriver.org

Vorking Together to Protect the State Scenic Harpeth River and Clean Water in Tennessee

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4-8-2013

Permit No. NC0030759

DRAFT

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER QUALITY

PERMIT

TO DISCHARGE WASTEWATER UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of North Carolina General Statute 143-215.1, other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission, and the Federal Water Pollution Control Act, as amended, the

City of Raleigh

is hereby authorized to discharge wastewater from a facility located at the

Smith Creek Wastewater Treatment Plant
NCSR 2044 southwest of Wake Forest
Wake County

to receiving waters designated as the Neuse River in the Neuse River Basin

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, III, and IV hereof.

The permit shall become effective .... ______ .

This permit and the authorization to discharge shall expire at midnight on .... **February 28 2018.**

Signed this day .... ________

DRAFT

Charles Wakild P.E., Director
Division of Water Quality
By Authority of the Environmental Management Commission

SUPPLEMENT TO PERMIT COVER SHEET

All previous NPDES Permits issued to this facility, whether for operation or discharge are hereby revoked, and as of this issuance, any previously issued permit bearing this number is no longer effective. Therefore, the exclusive authority to operate and discharge from this facility arises under the permit conditions, requirements, terms, and provisions included herein.

The City of Raleigh

is hereby authorized to:

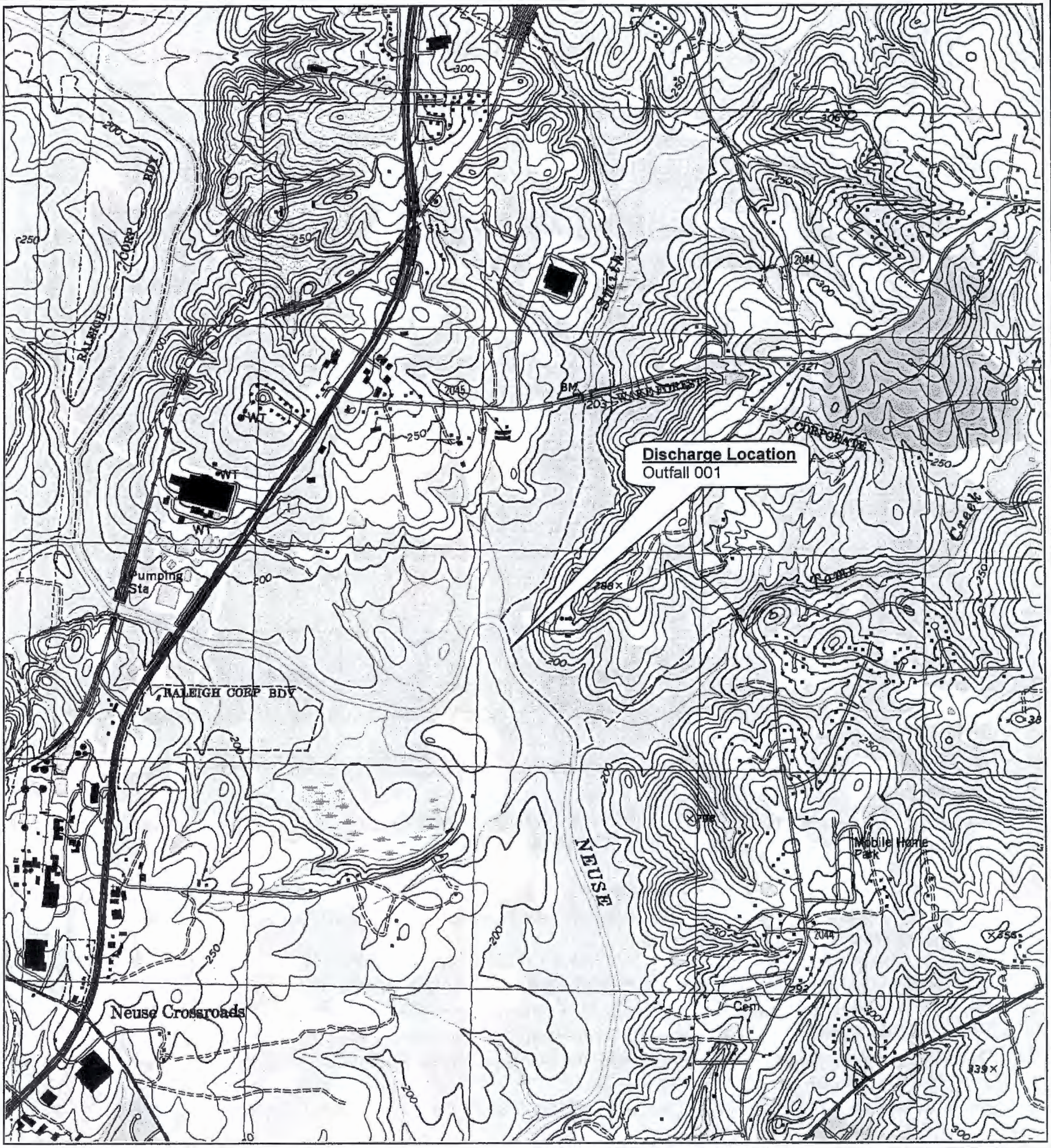
1. Continue operation of an existing 2.4 MGD wastewater treatment system, located at the Smith Creek Wastewater Treatment Plant, off of NCSR 2044, southwest of Wake Forest in Wake County. The system referenced herein consists of the following treatment units:
   - Mechanical bar screens;
   - Influent flume;
   - Continuous recording flow measurement;
   - Aerated grit removal;
   - Dual oxidation ditches;
   - Anaerobic/anoxic treatment basins;
   - Dual final clarifiers;
   - Tertiary filters;
   - Ultraviolet disinfection;
   - Cascade aeration;
   - Automatic sampler;
   - Chemical feed system;
   - Sludge thickening;
   - Diffused-air digestion; and
   - Sludge stabilization tanks.

2. Reuse non-potable treated effluent, in an amount up to 0.01 MGD of the total permitted flow, for irrigation and dust control on the property of the Smith Creek Wastewater Treatment Plant in accordance with condition A. (10.) of this permit;

3. After receiving an Authorization to Construct from the Division of Water Quality, construct and after submitting an Engineer's certification, operate facilities giving the system an ultimate treatment capacity of 3.0 MGD; and,

4. After receiving an Authorization to Construct from the Division of Water Quality, construct and after submitting an Engineer's certification, operate facilities giving the system an ultimate treatment capacity of 6.0 MGD; and,

5. Discharge treated wastewater from said treatment works at the location specified on the attached map through outfall 001 into the Neuse River, a class C-NSW water in the Neuse River Basin.



USGS Quad #: D24NE, Wake Forest
Lat: 35°54'23" Long.: 78°32'15"

N

SCALE
1:24,000
(1" = 2000')

City of Raleigh **NC0030759**

Smith Creek WWTP

Receiving Stream:	Neuse River
Stream Classification:	C, NSW
River Basin:	Neuse
Sub-Basin #:	03-04-02

A.(1.) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (2.4 MGD)

(a.) Beginning on the effective date of this permit and lasting until expansion above 2.4 MGD or permit expiration, the Permittee is authorized to discharge treated wastewater from Outfall 001. Such discharges shall be limited and monitored by the Permittee as specified below:

PARAMETER	EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS		
	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location [1]
Flow (MGD)	2.4			Continuous	Recording	Influent or Effluent
Total Monthly Flow (MG)	Monitor & Report			Monthly	Recorded or Calculated	Influent or Effluent
BOD_5 (Summer) [2,3]	5.0 mg/L	7.5 mg/L		Daily	Composite	Influent and Effluent
BOD_5 (Winter) [2,3]	10.0 mg/L	15.0 mg/L		Daily	Composite	Influent and Effluent
Total Suspended Solids [2]	30.0 mg/L	45.0 mg/L		Daily	Composite	Influent and Effluent
NH_3 as N (Summer) [3]	2.0 mg/L	6.0 mg/L		Daily	Composite	Effluent
NH_3 as N (Winter) [3]	4.0 mg/L	12.0 mg/L		Daily	Composite	Effluent
Dissolved Oxygen	Daily average not less than 5.0 mg/L			Daily	Grab	Effluent
Fecal Coliform	200/100 mL	400/100 mL		Daily	Grab	Effluent
Total Residual Chlorine [4]			28 ug/L	Daily	Grab	Effluent
Temperature				Daily	Grab	Effluent
TKN (mg/L)	Monitor & Report			Weekly	Composite	Effluent
NO_3-N + NO_2-N (mg/L)	Monitor & Report			Weekly	Composite	Effluent
TN (mg/L) [5]	Monitor & Report			Weekly	Composite	Effluent
TN Load [6,7]	Monitor & Report			Monthly	Calculated	Effluent
	70,814 pounds/year			Annually	Calculated	Effluent
Total Phosphorus	2.0 mg/L (quarterly average) [8]			Weekly	Composite	Effluent
pH	Between 6.0 and 9.0 Standard Units			Daily	Grab	Effluent
Chronic Toxicity [9]				Quarterly	Composite	Effluent

Footnotes:

1. See condition A. (4.) of this permit for instream monitoring requirements.
2. The monthly average BOD5 and Total Suspended Solids concentrations shall not exceed 15% of the respective influent value (85% removal).
3. Summer shall be defined as April 1 – October 31 with winter defined as the balance of the year.
4. Effluent monitoring and limitation only apply if chlorine or a chlorine derivative is added to the waste stream during treatment.
5. For a given wastewater sample, TN = TKN + NO3-N + NO2-N, where TN is total nitrogen, TKN is total Kjeldahl Nitrogen, and NO3-N and NO2-N are nitrate and nitrite nitrogen, respectively.
6. TN load is the mass quantity of total nitrogen discharged in a given time period. See condition A. (5.) of this permit.
7. Compliance with the TN Load limit shall be determined in accordance with condition A. (6.) of this permit.
8. The quarterly average for total phosphorus shall be the average of composite samples collected during each calendar quarter (January - March, April - June, July - September, October - December).
9. Chronic Toxicity (*Ceriodaphnia*) @ 5.3%, February, May, August, November; see special condition A. (7.) of this permit.

(b.) There shall be no discharge of floating solids or visible foam in other than trace amounts.

A.(2.) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (3.0 MGD)

(a.) Beginning upon expansion above 2.4 MGD and lasting until expansion above 3.0 MGD or permit expiration, the Permittee is authorized to discharge treated wastewater from Outfall 001. Such discharges shall be limited and monitored by the Permittee as specified below:

PARAMETER	EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS		
	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location [1]
Flow (MGD)	3.0			Continuous	Recording	Influent or Effluent
Total Monthly Flow (MG)	Monitor & Report			Monthly	Recorded or Calculated	Influent or Effluent
BOD_5 (Summer) [2,3]	5.0 mg/L	7.5 mg/L		Daily	Composite	Influent and Effluent
BOD_5 (Winter) [2,3]	10.0 mg/L	15.0 mg/L		Daily	Composite	Influent and Effluent
Total Suspended Solids [2]	30.0 mg/L	45.0 mg/L		Daily	Composite	Influent and Effluent
NH_3 as N (Summer) [3]	1.0 mg/L	3.0 mg/L		Daily	Composite	Effluent
NH_3 as N (Winter) [3]	2.0 mg/L	6.0 mg/L		Daily	Composite	Effluent
Dissolved Oxygen	Daily average not less than 5.0 mg/L			Daily	Grab	Effluent
Fecal Coliform	200/100 mL	400/100 mL		Daily	Grab	Effluent
Total Residual Chlorine [4]			28 ug/L	Daily	Grab	Effluent
Temperature				Daily	Grab	Effluent
TKN (mg/L)	Monitor & Report			Weekly	Composite	Effluent
NO_3-N + NO_2-N (mg/L)	Monitor & Report			Weekly	Composite	Effluent
TN (mg/L) [5]	Monitor & Report			Weekly	Composite	Effluent
TN Load [6,7]	Monitor & Report			Monthly	Calculated	Effluent
	70,814 pounds/year			Annually	Calculated	Effluent
Total Phosphorus	2.0 mg/L (quarterly average) [8]			Weekly	Composite	Effluent
pH	Between 6.0 and 9.0 Standard Units			Daily	Grab	Effluent
Chronic Toxicity [9]				Quarterly	Composite	Effluent

Footnotes:

1. See condition A. (4.) of this permit for instream monitoring requirements.
2. The monthly average BOD5 and Total Suspended Solids concentrations shall not exceed 15% of the respective influent value (85% removal).
3. Summer shall be defined as April 1 – October 31 with winter defined as the balance of the year.
4. Effluent monitoring and limitation only apply if chlorine or a chlorine derivative is added to the waste stream during treatment.
5. For a given wastewater sample, TN = TKN + NO3-N + NO2-N, where TN is total nitrogen, TKN is total Kjeldahl Nitrogen, and NO3-N and NO2-N are nitrate and nitrite nitrogen, respectively.
6. TN load is the mass quantity of total nitrogen discharged in a given time period. See condition A. (5.) of this permit.
7. Compliance with the TN Load limit shall be determined in accordance with condition A. (6.) of this permit.
8. The quarterly average for total phosphorus shall be the average of composite samples collected during each calendar quarter (January - March, April - June, July - September, October - December).
9. Chronic Toxicity (*Ceriodaphnia*) @ 6.5%, February, May, August, November; see special condition A. (8.) of this permit.

(b.) There shall be no discharge of floating solids or visible foam in other than trace amounts.

A.(3.) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

(a.) Beginning upon expansion above 3.0 MGD and lasting until expiration, the Permittee is authorized to discharge treated wastewater from Outfall 001. Such discharges shall be limited and monitored by the Permittee as specified below:

PARAMETER	EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS		
	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location [1]
Flow (MGD)	6.0			Continuous	Recording	Influent or Effluent
Total Monthly Flow (MG)	Monitor & Report			Monthly	Recorded or Calculated	Influent or Effluent
BOD_5 (Summer) [2,3]	5.0 mg/L	7.5 mg/L		Daily	Composite	Influent and Effluent
BOD_5 (Winter) [2,3]	10.0 mg/L	15.0 mg/L		Daily	Composite	Influent and Effluent
Total Suspended Solids [2]	30.0 mg/L	45.0 mg/L		Daily	Composite	Influent and Effluent
NH_3 as N (Summer) [3]	1.0 mg/L	3.0 mg/L		Daily	Composite	Effluent
NH_3 as N (Winter) [3]	2.0 mg/L	6.0 mg/L		Daily	Composite	Effluent
Dissolved Oxygen	Daily average not less than 5.0 mg/L			Daily	Grab	Effluent
Fecal Coliform	200/100 mL	400/100 mL		Daily	Grab	Effluent
Total Residual Chlorine [4]			28 ug/L	Daily	Grab	Effluent
Temperature				Daily	Grab	Effluent
TKN (mg/L)	Monitor & Report			Weekly	Composite	Effluent
NO_3-N + NO_2-N (mg/L)	Monitor & Report			Weekly	Composite	Effluent
TN (mg/L) [5]	Monitor & Report			Weekly	Composite	Effluent
TN Load [6,7]	Monitor & Report			Monthly	Calculated	Effluent
	70,814 pounds/year			Annually	Calculated	Effluent
Total Phosphorus	2.0 mg/L (quarterly average) [8]			Weekly	Composite	Effluent
pH	Between 6.0 and 9.0 Standard Units			Daily	Grab	Effluent
Chronic Toxicity [9]				Quarterly	Composite	Effluent

Footnotes:

1. See condition A. (4.) of this permit for instream monitoring requirements.
2. The monthly average BOD5 and Total Suspended Solids concentrations shall not exceed 15% of the respective influent value (85% removal).
3. Summer shall be defined as April 1 – October 31 with winter defined as the balance of the year.
4. Effluent monitoring and limitation only apply if chlorine or a chlorine derivative is added to the waste stream during treatment.
5. For a given wastewater sample, TN = TKN + NO3-N + NO2-N, where TN is total nitrogen, TKN is total Kjeldahl Nitrogen, and NO3-N and NO2-N are nitrate and nitrite nitrogen, respectively.
6. TN load is the mass quantity of total nitrogen discharged in a given time period. See condition A. (5.) of this permit.
7. Compliance with the TN Load limit shall be determined in accordance with condition A. (6.) of this permit.
8. The quarterly average for total phosphorus shall be the average of composite samples collected during each calendar quarter (January - March, April - June, July - September, October - December).
9. Chronic Toxicity (Ceriodaphnia) @ 12%, February, May, August, November; see special condition A. (9.) of this permit.

(b.) There shall be no discharge of floating solids or visible foam in other than trace amounts.

A.(4.) INSTREAM MONITORING REQUIREMENTS

Instream monitoring is required for the following parameters at the locations specified:

PARAMETER	SAMPLE TYPE	LOCATION[1]
Dissolved Oxygen	Grab	U, D1, D2
Temperature	Grab	U, D1, D2

Footnotes:

1. Sample Locations: U – Upstream at least 100 feet from the outfall. D1: Downstream at U.S. Highway 401. D2: Downstream at NCSR 2215. Stream samples shall be collected three times per week during the months of June, July, August, and September and weekly during the remainder of the year. These instream monitoring requirements are waived so long as the Permittee maintains full and active member ship in the Lower Neuse Basin Association, Inc. (LNBA) for the subject facility. Upon termination or cessation of its membership in the LNBA, these instream monitoring requirements are reinstated immediately, and the Permittee must notify the Division within five (5) business days.

A.(5.) CALCULATION OF TOTAL NITROGEN LOADS

(a.) The Permittee shall calculate the monthly and annual discharge TN loads from the WWTP as follows:

(i.) Monthly TN Load (pounds/month) = TN x TMF x 8.34

where:

TN = the average total nitrogen concentration (mg/L) of the composite samples collected during the calendar month

TMF = the Total Monthly Flow of wastewater discharged during the month (MG/month)

8.34 = conversion factor, from (mg/L x MG) to pounds

(ii.) Annual TN Load (pounds/yr) = Sum of Monthly TN Loads (12) for the calendar year

(b.) The Permittee shall report monthly Total Nitrogen results (mg/L and lb/mo) in the discharge monitoring report for that month and shall report each year's annual results (lb/yr) in the December report for that year.

A.(6.) ANNUAL LIMITS FOR TOTAL NITROGEN

(a.) Total Nitrogen (TN) allocations and TN Load limits for NPDES dischargers in the Neuse River basin are annual limits and are applied for the calendar year.

(b.) For any given calendar year, the Permittee shall be in compliance with the annual TN Load limit in this Permit if:

(i.) the Permittee's annual TN Load is less than or equal to said limit, or
(ii.) the Permittee is a Co-Permittee Member of a compliance association.

(c.) The TN Load limit in this Permit (if any) may be modified as the result of allowable changes in the Permittee's TN allocation.

(i.) Allowable changes include those resulting from purchase of TN allocation from the Wetlands Restoration Fund; purchase, sale, trade, or lease of allocation between the Permittee and other dischargers; regionalization; and other transactions approved by the Division.

(ii.) The Permittee may request a modification of the TN Load limit in this Permit to reflect allowable changes in its TN allocation. Upon receipt of timely and proper application, the

Division will modify the permit as appropriate and in accordance with state and federal program requirements.

(iii.) Changes in TN limits become effective on January 1 of the year following permit modification. The Division must receive application no later than August 31 for changes proposed for the following calendar year.

(iv.) Application shall be sent to:

NCDWQ / NPDES Unit
Attn: Neuse River Basin Coordinator
1617 Mail Service Center
Raleigh, NC 27699-1617

(d.) If the Permittee is a member and Co-Permittee of an approved compliance association, its TN discharge is governed by that association's group NPDES permit and the TN limits therein.

(i.) The Permittee shall be considered a Co-Permittee Member for any given calendar year in which it is identified as such in Appendix A of the association's group NPDES permit.

(ii.) Association roster(s) and members' TN allocations will be updated annually and in accordance with state and federal program requirements.

(iii.) If the Permittee intends to join or leave a compliance association, the Division must be notified of the proposed action in accordance with the procedures defined in the association's NPDES permit.

(A) Upon receipt of timely and proper notification, the Division will modify the permit as appropriate and in accordance with state and federal program requirements.

(B) Membership changes in a compliance association become effective on January 1 of the year following modification of the association's permit.

(e.) The TN monitoring and reporting requirements in this individual Permit remain in effect until expiration of this Permit and are not affected by the Permittee's membership in a compliance association.

A.(7.) CHRONIC TOXICITY PERMIT LIMIT (Quarterly at 2.4 MGD)

The effluent discharge shall at no time exhibit observable inhibition of reproduction or significant mortality to *Ceriodaphnia dubia* at an effluent concentration of **5.3%.**

The permit holder shall perform at a minimum, quarterly monitoring using test procedures outlined in the "North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure," Revised February 1998, or subsequent versions or "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions. The tests will be performed during the months of **February, May, August, and November**. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

If the test procedure performed as the first test of any single quarter results in a failure or ChV below the permit limit, then multiple-concentration testing shall be performed at a minimum, in each of the two following months as described in "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions.

The chronic value for multiple concentration tests will be determined using the geometric mean of the highest concentration having no detectable impairment of reproduction or survival and the lowest concentration that does have a detectable impairment of reproduction or survival. The definition of "detectable impairment," collection methods, exposure regimes, and further statistical methods are specified in the "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the months in which tests were performed, using the parameter

code **TGP3B** for the pass/fail results and **THP3B** for the Chronic Value. Additionally, DWQ Form AT-3 (original) is to be sent to the following address:

Attention: Environmental Sciences Section
North Carolina Division of Water Quality
1621 Mail Service Center
Raleigh, North Carolina 27699-1621

Completed Aquatic Toxicity Test Forms shall be filed with the Environmental Sciences Section no later than 30 days after the end of the reporting period for which the report is made.

Test data shall be complete, accurate, include all supporting chemical/physical measurements and all concentration/response data, and be certified by laboratory supervisor and ORC or approved designate signature. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should there be no discharge of flow from the facility during a month in which toxicity monitoring is required, the permittee will complete the information located at the top of the aquatic toxicity (AT) test form indicating the facility name, permit number, pipe number, county, and the month/year of the report with the notation of "No Flow" in the comment area of the form. The report shall be submitted to the Environmental Sciences Section at the address cited above.

Should the permittee fail to monitor during a month in which toxicity monitoring is required, monitoring will be required during the following month.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Water Quality indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival, minimum control organism reproduction, and appropriate environmental controls, shall constitute an invalid test and will require immediate follow-up testing to be completed no later than the last day of the month following the month of the initial monitoring.

A.(8.) CHRONIC TOXICITY PERMIT LIMIT (Quarterly at 3.0 MGD)

The effluent discharge shall at no time exhibit observable inhibition of reproduction or significant mortality to *Ceriodaphnia dubia* at an effluent concentration of **6.5%.**

The permit holder shall perform at a minimum, quarterly monitoring using test procedures outlined in the "North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure," Revised February 1998, or subsequent versions or "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions. The tests will be performed during the months of **February, May, August, and November**. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

If the test procedure performed as the first test of any single quarter results in a failure or ChV below the permit limit, then multiple-concentration testing shall be performed at a minimum, in each of the two following months as described in "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions.

The chronic value for multiple concentration tests will be determined using the geometric mean of the highest concentration having no detectable impairment of reproduction or survival and the lowest concentration that does have a detectable impairment of reproduction or survival. The definition of "detectable impairment," collection methods, exposure regimes, and further statistical methods are specified in the "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the months in which tests were performed, using the parameter

code **TGP3B** for the pass/fail results and **THP3B** for the Chronic Value. Additionally, DWQ Form AT-3 (original) is to be sent to the following address:

Attention: Environmental Sciences Section
North Carolina Division of Water Quality
1621 Mail Service Center
Raleigh, North Carolina 27699-1621

Completed Aquatic Toxicity Test Forms shall be filed with the Environmental Sciences Section no later than 30 days after the end of the reporting period for which the report is made.

Test data shall be complete, accurate, include all supporting chemical/physical measurements and all concentration/response data, and be certified by laboratory supervisor and ORC or approved designate signature. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should there be no discharge of flow from the facility during a month in which toxicity monitoring is required, the permittee will complete the information located at the top of the aquatic toxicity (AT) test form indicating the facility name, permit number, pipe number, county, and the month/year of the report with the notation of "No Flow" in the comment area of the form. The report shall be submitted to the Environmental Sciences Section at the address cited above.

Should the permittee fail to monitor during a month in which toxicity monitoring is required, monitoring will be required during the following month.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Water Quality indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival, minimum control organism reproduction, and appropriate environmental controls, shall constitute an invalid test and will require immediate follow-up testing to be completed no later than the last day of the month following the month of the initial monitoring.

A.(9.) CHRONIC TOXICITY PERMIT LIMIT (Quarterly at 6.0 MGD)

The effluent discharge shall at no time exhibit observable inhibition of reproduction or significant mortality to *Ceriodaphnia dubia* at an effluent concentration of **12%.**

The permit holder shall perform at a minimum, quarterly monitoring using test procedures outlined in the "North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure," Revised February 1998, or subsequent versions or "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions. The tests will be performed during the months of **February, May, August, and November**. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

If the test procedure performed as the first test of any single quarter results in a failure or ChV below the permit limit, then multiple-concentration testing shall be performed at a minimum, in each of the two following months as described in "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions.

The chronic value for multiple concentration tests will be determined using the geometric mean of the highest concentration having no detectable impairment of reproduction or survival and the lowest concentration that does have a detectable impairment of reproduction or survival. The definition of "detectable impairment," collection methods, exposure regimes, and further statistical methods are specified in the "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-February 1998) or subsequent versions.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the months in which tests were performed, using the parameter

code **TGP3B** for the pass/fail results and **THP3B** for the Chronic Value. Additionally, DWQ Form AT-3 (original) is to be sent to the following address:

Attention: Environmental Sciences Section
North Carolina Division of Water Quality
1621 Mail Service Center
Raleigh, North Carolina 27699-1621

Completed Aquatic Toxicity Test Forms shall be filed with the Environmental Sciences Section no later than 30 days after the end of the reporting period for which the report is made.

Test data shall be complete, accurate, include all supporting chemical/physical measurements and all concentration/response data, and be certified by laboratory supervisor and ORC or approved designate signature. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should there be no discharge of flow from the facility during a month in which toxicity monitoring is required, the permittee will complete the information located at the top of the aquatic toxicity (AT) test form indicating the facility name, permit number, pipe number, county, and the month/year of the report with the notation of "No Flow" in the comment area of the form. The report shall be submitted to the Environmental Sciences Section at the address cited above.

Should the permittee fail to monitor during a month in which toxicity monitoring is required, monitoring will be required during the following month.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Water Quality indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival, minimum control organism reproduction, and appropriate environmental controls, shall constitute an invalid test and will require immediate follow-up testing to be completed no later than the last day of the month following the month of the initial monitoring.

A.(10.) SPRAY IRRIGATION CONDITION

The spray irrigation of tertiary treated effluent around the existing wastewater treatment facilities is authorized by the Division under the following conditions:

- The irrigation water will supplement rainfall during dry periods of the year only;
- The effluent applied will be quantified by a meter;
- The maximum application rate shall not exceed 0.25-inch/hour or 1.0-inch/day;
- No runoff shall occur from the irrigated areas;
- Appropriate notice shall be supplied at the entrance of the facility indicating that the area is being irrigated with reclaimed water that should not be used for drinking; and
- Irrigation shall occur within the fenced perimeter of the wastewater treatment plant with controlled public access.

A.(11.) EFFLUENT POLLUTANT SCAN

(a.) The Permittee shall perform a total of three (3) Effluent Pollutant Scans for all parameters listed below. The analytical methods shall be in accordance with 40 CFR Part 136 and shall be sufficiently sensitive to determine whether parameters are present in concentrations greater than applicable standards and criteria. Sampling dates shall represent seasonal variation. Unless otherwise indicated, metals shall be analyzed as "total recoverable."

Ammonia (as N)	Trans-1,2-dichloroethylene	Bis (2-chloroethyl) ether
Chlorine (total residual, TRC)	1,1-dichloroethylene	Bis (2-chloroisopropyl) ether
Dissolved oxygen	1,2-dichloropropane	Bis (2-ethylhexyl) phthalate
Nitrate/Nitrite	1,3-dichloropropylene	4-bromophenyl phenyl ether
Total Kjeldahl nitrogen	Ethylbenzene	Butyl benzyl phthalate
Oil and grease	Methyl bromide	2-chloronaphthalene
Total Phosphorus	Methyl chloride	4-chlorophenyl phenyl ether
Total dissolved solids	Methylene chloride	Chrysene
Hardness	1,1,2,2-tetrachloroethane	Di-n-butyl phthalate
Antimony	Tetrachloroethylene	Di-n-octyl phthalate
Arsenic	Toluene	Dibenzo(a,h)anthracene
Beryllium	1,1,1-trichloroethane	1,2-dichlorobenzene
Cadmium	1,1,2-trichloroethane	1,3-dichlorobenzene
Chromium	Trichloroethylene	1,4-dichlorobenzene
Copper	Vinyl chloride	3,3-dichlorobenzidine
Lead	***Acid-extractable compounds:***	Diethyl phthalate
Mercury	P-chloro-m-creso	Dimethyl phthalate
Nickel	2-chlorophenol	2,4-dinitrotoluene
Selenium	2,4-dichlorophenol	2,6-dinitrotoluene
Silver	2,4-dimethylphenol	1,2-diphenylhydrazine
Thallium	4,6-dinitro-o-cresol	Fluoranthene
Zinc	2,4-dinitrophenol	Fluorene
Cyanide	2-nitrophenol	Hexachlorobenzene
Total phenolic compounds	4-nitrophenol	Hexachlorobutadiene
Volatile organic compounds:	Pentachlorophenol	Hexachlorocyclo-pentadiene
Acrolein	Phenol	Hexachloroethane
Acrylonitrile	2,4,6-trichlorophenol	Indeno(1,2,3-cd)pyrene
Benzene	***Base-neutral compounds:***	Isophorone
Bromoform	Acenaphthene	Naphthalene
Carbon tetrachloride	Acenaphthylene	Nitrobenzene
Chlorobenzene	Anthracene	N-nitrosodi-n-propylamine
Chlorodibromomethane	Benzidine	N-nitrosodimethylamine
Chloroethane	Benzo(a)anthracene	N-nitrosodiphenylamine
2-chloroethylvinyl ether	Benzo(a)pyrene	Phenanthrene
Chloroform	3,4 benzofluoranthene	Pyrene
Dichlorobromomethane	Benzo(ghi)perylene	1,2,4-trichlorobenzene
1,1-dichloroethane	Benzo(k)fluoranthene	
1,2-dichloroethane	Bis (2-chloroethoxy) methane	

(b.) Reporting. The effluent pollutant scan shall be performed once/year during 2013, 2014, and 2015, and test results shall be reported to the Division on DWQ Form-A MR-PPA1 or in a form approved by the Director by December 31st of each designated sampling year. The report shall be submitted to the following address: NC DENR / DWQ / Central Files, 1617 Mail Service Center, Raleigh, North Carolina 27699-1617.

A.(12.) TOTAL NITROGEN ALLOCATIONS

(a.) The following table lists the Total Nitrogen (TN) allocation(s) assigned to, acquired by, or transferred to the Permittee in accordance with the Neuse River nutrient management rule (T15A NCAC 02B .0234) and the status of each as of permit issuance. For compliance purposes, this table does not supercede any TN limit(s) established elsewhere in this permit or in the NPDES permit of a compliance association of which the Permittee is a Co-Permittee Member.

ALLOCATION TYPE	SOURCE	DATE	ALLOCATION AMOUNT [1]		STATUS
			Estuary (lb/yr)	Discharge (lb/yr)	
Base	Assigned by Rule (T15A NCAC 02B .0234)	12/7/97; 4/1/03	33,790	67,579	Active
Supplemental	Jones Dairy Farm Corporation NC0064149		1,618	3,235	Active
		TOTAL		**70,814**	Active

Footnote:

1. Transport Factor = 50%

4-8-2013
Sandy

Memorandum of Agreement
Between
The State of North Carolina's Division of Water Quality
And
The Lower Neuse Basin Association Permittees

Effective:
August 1, 2009 through July 31, 2014

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MEMORANDUM OF AGREEMENT

This Memorandum of Agreement (MOA) is made by and between the NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES'S DIVISION OF WATER QUALITY (DWQ), the NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) DISCHARGERS in the Lower Neuse River basin who have voluntarily executed this MOA (the LNBA PERMITTEES), and the LOWER NEUSE BASIN ASSOCIATION (the LNBA), a non-profit corporation whose members include the LNBA PERMITTEES. The MOA includes all the attached tables and appendices. This MOA does not affect any influent or effluent monitoring requirement or any other of the NPDES permit requirements of individual permit holders with the one exception of performing upstream and downstream water quality monitoring. The LNBA PERMITTEES are exempted from instream monitoring as specified in their individual NPDES permits beginning on the effective date of this MOA and continuing for the duration of each permittee's participation in this MOA. Subsequent to the execution of this MOA, the DWQ will issue a letter to each PERMITTEE notifying the permittee that the instream monitoring requirements of its permit are not effective for as long as this MOA is in place and the permittee remains a party to this MOA.

The purpose of this MOA is to establish a formal agreement between the DWQ, the LNBA PERMITTEES, and the LNBA. This MOA authorizes the LNBA to act on behalf of the PERMITTEES as described herein. This MOA identifies the responsibilities of the LNBA Permittees and the LNBA for surface water monitoring and reporting within the Lower Neuse River Basin. The water quality monitoring will occur at strategically located surface water sites to obtain information on water quality in the basin. Monitoring sites and parameters were established by the DWQ and are listed in Table A-1, such that the instream monitoring is efficient, effective, and basin-oriented.

The LNBA will perform the monitoring activities described herein on behalf of LNBA PERMITTEES who are members in good standing of the LNBA. Each LNBA PERMITTEE agrees to remain a member in good standing of the LNBA. The LNBA will contract for the performance of the monitoring activities described herein with a laboratory appropriately certified by the DWQ for the required laboratory and field analyses. Sample collection and field measurements will be made by the LNBA PERMITTEES, the LNBA, or a sub-contractor who will act as agent(s) of the LNBA PERMITTEES for the sole purpose of performing monitoring services required by this MOA. It will be the responsibility of the LNBA to coordinate the collection and analyses of the water quality monitoring data for the locations, parameters, and frequencies specified in Table A-1 of this MOA. Sample collection, field measurement, and target reporting limits are specified in Appendix B of this MOA. Monthly and annual reporting requirements, including data format and data summaries are described in Appendix C of this MOA.

The LNBA shall submit the water quality data to the DWQ using the format documented in Appendix C of this MOA preferably in Microsoft® Excel 2000, a subsequent version, or the equivalent. The LNBA shall submit the water quality data to the DWQ within 90 days of the end of the month in which the sampling was performed. All data shall be archived by the LNBA for a period of 5 years. Each LNBA PERMITTEE has the right to review and comment on work, data or reports prepared by any contractor on behalf of the LNBA PERMITTEES and to notify the DWQ of any objection or disagreement with any portion of the work, data, or reports. Unless such notice is made within thirty (30) days of submission of each annual report (or other reports) to the DWQ, it shall be deemed to be waived and the work, data and reports submitted shall be deemed to be approved by the LNBA PERMITTEES. Failure by the LNBA PERMITTEES or the LNBA to collect or analyze the water quality data as described in this MOA or to provide the data to the DWQ in the required format may result in the revocation of this MOA by the DWQ and the return to individual upstream and downstream monitoring requirements, as specified in the individual NPDES permits of the LNBA PERMITTEES.

The LNBA shall submit an annual written report that summarizes the previous calendar year's sampling results and formally finalizes the water quality data. The report shall be submitted no later than April 30th each year that this MOA is in effect. The annual report shall include the NPDES permit number of each actively participating permit holder and a contact name and phone number for each member. Appendix C of this MOA describes the required annual report content. Two copies, signed by the LNBA chairman, of these and any other reports required herein shall be submitted to the DWQ Coalition Coordinators at 1621 Mail Service Center, Raleigh, NC 27699-1621.

Stream sampling may be discontinued at such times as flow conditions in the receiving waters or extreme weather conditions will result in a substantial risk of injury or death to persons collecting samples. Sampling may also be discontinued when environmental conditions, such as a dry stream, prevent sample collection. In such cases, on each day that sampling is discontinued, the DWQ Coalition Coordinators shall be notified within one week of the discontinuance and written justification for the discontinuance shall be submitted with the monthly data submittal. This provision shall not be utilized to avoid the requirements of this MOA when performance of these requirements is attainable. When there is a sampling discontinuance pursuant to this provision, sampling shall be resumed at the first opportunity.

This MOA may be modified by the written consent of the DWQ and the LNBA. The DWQ or the LNBA may determine that it is necessary to request changes in monitoring frequency, parameters or sites to be sampled. Any such changes can only be made by a written amendment to this MOA agreed to by the DWQ and the LNBA. The amendment shall be signed by the LNBA chairman and by the DWQ. Such amendments may be entered into at any time.

The following additional dischargers may enter into this MOA subsequent to the effective date hereof:

1) Dischargers who receive a NPDES permit within the Lower Neuse River Basin, or
2) Dischargers who have NPDES permits within the Lower Neuse River Basin but are not parties to this Agreement.

The addition of such dischargers to this MOA may be made only with the consent of the DWQ and the LNBA and shall require a written amendment to this MOA signed by the LNBA chairman, by the DWQ, and by an authorized representative of any such discharger who wishes to enter into the MOA. The DWQ will not unreasonably withhold consent to the addition of a discharger to the MOA. The DWQ will consider modification of the existing monitoring program described in this MOA for the addition of a discharger to the MOA. Such amendments may be made at any time that this MOA is in effect. The LNBA PERMITTEES included in this MOA are listed in Table 1.

This MOA shall be effective until July 31, 2014 unless extended by the consent of both the DWQ and the LNBA. Upon sixty (60) days written notice, the DWQ or the LNBA may terminate this MOA for any reason. Upon termination of this MOA, the monitoring requirements contained in the individual NPDES permit of each LNBA PERMITTEE shall become effective immediately. An individual permit holder may terminate and cancel its participation in this MOA by providing sixty (60) day written notice to the LNBA, the DWQ Coalition Coordinators, the appropriate DWQ Regional Office, and the DWQ NPDES Unit. The monitoring requirements contained in the individual NPDES permit shall become effective immediately upon such cancellation or termination. In the event a permit holder terminates or cancels its participation in this MOA or its membership in the LNBA is terminated for any reason, the LNBA may request that DWQ review the monitoring plan described in this MOA for a possible reduction in sampling effort or requirements.

IN WITNESS WHEREOF, the parties have caused the execution of this instrument by authority duly given, to be effective as of the date executed by the DWQ

DIVISION OF WATER QUALITY	**LOWER NEUSE BASIN ASSOCIATION**
By: signed 7/29/2009	By: signed 7/28/2009
Coleen Sullins **Director** **Division of Water Quality**	**Daniel F. McLawhorn** **Chairman** **Lower Neuse Basin Association**
Date: ____________	Date: ____________

LNBA PERMITEE SIGNATURES

Permittee	NPDES Number	Signature
Carolina Power and Light (CP&L) d/b/a Progress Energy Carolinas, Inc. Lee Steam Electric Plant	NC0003417	received 6/09/2009 Kris Edmondson Plant Manager

Permittee	NPDES Number	Signature
EI DuPont Kinston Facility	NC0003760	received 6/30/2009 Harold Thomas Plant Manager

Permittee	NPDES Number	Signature
Town of Benson Benson WWTP	NC0020389	received 6/02/2009 Keith Langdon Town Manager

Permittee	NPDES Number	Signature
City of Havelock Havelock WWTP	NC0021253	received 6/04/2009 Jim Freeman City Manager

Permittee	NPDES Number	Signature
Town of La Grange La Grange WWTP	NC0021644	received 6/02/2009 John Craft Town Manager

LNBA PERMITEE SIGNATURES

Permittee	NPDES Number	Signature
City of Wilson Wilson WWTP	NC0023906	received 6/04/2009 Grant Goings City Manager

Permittee	NPDES Number	Signature
City of Goldsboro Goldsboro WWTP	NC0023949	received 6/08/2009 Joseph Huffman City Manager

Permittee	NPDES Number	Signature
City of Kinston Kinston Regional WRF	NC0024236	received 6/19/2009 Scott Stevens City Manager

Permittee	NPDES Number	Signature
City of New Bern New Bern WWTP	NC0025348	received 6/16/2009 Walter B. Hartman, Jr. City Manager

Permittee	NPDES Number	Signature
Town of Clayton Little Creek WWTP	NC0025453	received 6/09/2009 Steve Biggs Town Manager

LNBA PERMITEE SIGNATURES

Permittee	NPDES Number	Signature
City of Raleigh Neuse River WWTP	NC0029033	received 7/2/2009 Dale Crisp Public Utilities Director

Permittee	NPDES Number	Signature
Town of Farmville Farmville WWTP	NC0029572	received 6/08/2009 Richard Hicks Town Manager

Permittee	NPDES Number	Signature
Johnston County Central Johnston County WWTP	NC0030716	received 6/11/2009 Rick J. Hester County Manager

Permittee	NPDES Number	Signature
City of Raleigh Smith Creek WWTP	NC0030759	received 7/2/2009 Dale Crisp Public Utilities Director

Permittee	NPDES Number	Signature
Contentnea Metropolitan Sewerage District Contentnea MSD WWTP	NC0032077	received 6/03/2009 Charles M. Smithwick, Jr. District Manager

LNBA PERMITEE SIGNATURES

Permittee	NPDES Number	Signature
Town of Cary North Cary WRF	NC0048879	received 6/03/2009 Benjamin T. Shivar Town Manager

Permittee	NPDES Number	Signature
Town of Apex Apex WRF	NC0064050	received 6/10/2009 Bruce Radford Town Manager

Permittee	NPDES Number	Signature
Town of Kenly Kenly Regional WWTP	NC0064891	received 6/11/2009 Scott Shelton Town Manager

Permittee	NPDES Number	Signature
Town of Cary South Cary WRF	NC0065102	received 6/03/2009 Benjamin T. Shivar Town Manager

Permittee	NPDES Number	Signature
Town of Fuquay-Varina Terrible Creek WWTP	NC0066516	received 7/24/2009 Andy Hedrick Town Manager

LNBA PERMITEE SIGNATURES

Permittee	NPDES Number	Signature
City of Raleigh Little Creek WWTP	NC0079316	received 7/2/2009 Dale Crisp Public Utilities Director

Permittee	NPDES Number	Signature
Johnston County Johnston County WTP	NC0084735	received 6/11/2009 Rick J. Hester County Manager

Table 1. LNBA PERMITTEES

NPDES Permit Number	Lower Neuse Basin Association Permittees Ownership and Facility	Authorized Representative and Title	County	Region	8 Digit HUC
NC0003417	Carolina Power and Light (CP&L) d/b/a Progress Energy Carolinas, Inc. — Lee Steam Plant	Kris Edmondson Plant Manager	Wayne	WaRO	03020201
NC0003760	E. I. DuPont — Kinston Plant	Harold Thomas Plant Manager	Lenoir	WaRO	03020202
NC0020389	Town of Benson — Benson WWTP	Keith Langdon Town Manager	Johnston	RRO	03020201
NC0021253	City of Havelock — Havelock WWTP	Jim Freeman City Manager	Craven	WaRO	03020204
NC0021644	Town of La Grange — La Grange WWTP	John Craft Town Manager	Lenoir	WaRO	03020202
NC0023906	City of Wilson — Wilson WWTP	Grant Goings City Manager	Wilson	RRO	03020203
NC0023949	City of Goldsboro — Goldsboro WWTP	Joseph Huffman City Manager	Wayne	WaRO	03020202
NC0024236	City of Kinston — Regional Water Reclamation Facility	Scott Stevens City Manager	Lenoir	WaRO	03020202
NC0025348	City of New Bern — New Bern WWTP	William B. Hartman, Jr. City Manager	Craven	WaRO	03020204
NC0025453	Town of Clayton — Little Creek WWTP	Steve Biggs Town Manager	Johnston	RRO	03020201
NC0029033	City of Raleigh — Neuse River WWTP	Dale Crisp Public Utilities Director	Wake	RRO	03020201
NC0029572	Town of Farmville — Farmville WWTP	Richard N. Hicks Town Manager	Pitt	WaRO	03020203
NC0030716	Johnston County — Central Johnston County WWTP	Rick J. Hester County Manager	Johnston	RRO	03020201
NC0030759	City of Raleigh — Smith Creek WWTP	Dale Crisp Public Utilities Director	Wake	RRO	03020201
NC0032077	Contentnea Metropolitan Sewerage District — Contentnea MSD WWTP	Charles M. Smithwick, Jr. District Manager	Pitt	WaRO	03020203
NC0048879	Town of Cary — North WWTP	Benjamin T. Shivar Town Manager	Wake	RRO	03020201
NC0064050	Town of Apex — Apex WRF	Bruce Radford Town Manager	Wake	RRO	03020201
NC0064891	Town of Kenly — Kenly Regional WWTP	Scott Shelton Town Manager	Johnston	RRO	03020201
NC0065102	Town of Cary — South WWTP	Benjamin T. Shivar Town Manager	Wake	RRO	03020201
NC0066516	Town of Fuquay Varina — Terrible Creek WWTP	Andy Hedrick Town Manager	Wake	RRO	03020201
NC0079316	City of Raleigh — Little Creek WWTP	Dale Crisp Public Utilities Director	Wake	RRO	03020203
NC0084735	Johnston County — Johnston County WTP	Rick J. Hester County Manager	Johnston	RRO	03020201

APPENDIX A - LNBA MONITORING PROGRAM

Table A-1 LNBA Sampling Stations, Parameters and Sampling Frequency

STATION NUMBER	LOCATION	Station Comments	LATITUDE (dd.dddd)	LONGITUDE (dd.dddd)	COUNTY	8 Digit HUC	STREAM CLASS	Field Measurements (Temp, DO, pH, Conductivity)	*Nutrients	**Metals	Turbidity	Suspended Residue	Fecal Coliform	Chlorophyll a
J2230000	SMITH CRK AT SR 2045 BURLINGTON MILL RD NR WAKE FOREST	DWQ benthic and fish station.	35.9182	-78.5348	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J2330000	NEUSE RIV AT SR 2215 BUFFALO RD NR NEUSE	dns Smith Creek WWTP	35.8479	-78.5302	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J2360000	NEUSE RIV ABOVE MILBURNIE DAM NR RALEIGH	sample upstream of dam	35.8022	-78.5386	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J3210000	CRABTREE CRK AT LASSITER MILL DAM AT RALEIGH	dns North Cary WRF	35.8272	-78.6508	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J3970000	WALNUT CRK AT SR 2551 BARWELL RD NR RALEIGH	DWQ benthic station	35.7493	-78.5345	WAKE	03020201	C NSW	M+2SM	M	M	M	M	M	
J4050000	NEUSE RIV AT SR 2555 AUBURN KNIGHTDALE RD NR RALEIGH	ups Neuse River WWTP	35.7266	-78.5139	WAKE	03020201	C NSW	M+2SM	M	M	M	M	M	
J4080000	POPLAR CRK AT SR 2049 BETHLEHEM RD NR KNIGHTDALE	last bridge before Neuse	35.7309	-78.4776	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J4130000	NEUSE RIV AT SR 1700 COVERED BRIDGE RD NR ARCHERS LODGE	dns Neuse River WWTP, ups Little Creek (Clayton) WWTP	35.6749	-78.4364	JOHNSTON	03020201	WS-V NSW	M+2SM	M	M	M	M	M	
J4170000	NEUSE RIV AT NC 42 NR CLAYTON	dns Little Creek (Clayton) WWTP, DWQ benthic station, DWQ AMS station, USGS gage	35.6473	-78.4056	JOHNSTON	03020201	WS-IV NSW	M+2SM	M	M	M	M	M	
J4190000	NEUSE RIV AT SR 1908 FIRE DEPT DR NR WILSONS MILLS	ups Johnston County WTP	35.6067	-78.3374	JOHNSTON	03020201	WS-IV NSW	M+2SM	M		M	M	M	
J4414000	SWIFT CRK AT SR 1152 HOLLY SPRINGS RD NR MACEDONIA	ups Lake Wheeler, DWQ benthic station, USGS gage	35.7187	-78.7527	WAKE	03020201	WS-III NSW	M+2SM	M		M	M	M	
J4590000	SWIFT CRK AT NC 210 NR SMITHFIELD		35.5186	-78.3819	JOHNSTON	03020201	C NSW	M+2SM	M		M	M	M	
J4619000	MIDDLE CRK AT LUFKIN RD NR APEX	ups Apex WWTP, dns Hwy 1	35.71311	-78.8381	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J4690000	MIDDLE CRK AT SR 1152 HOLLY SPRINGS RD NR HOLLY SPRINGS	ups South Cary WRF, dns Apex WWTP	35.6609	-78.8042	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J4868000	MIDDLE CRK AT SR 1375 LAKE WHEELER RD NR BANKS	dns South Cary WRF, ups Terrible Creek	35.6356	-78.7279	WAKE	03020201	C NSW	M+2SM	M	M	M	M	M	
J4980000	MIDDLE CRK AT SR 1006 OLD STAGE ROAD NR WILLOW SPRINGS	dns of Terrible Creek	35.6091	-78.6866	WAKE	03020201	C NSW	M+2SM	M		M	M	M	
J5010000	MIDDLE CRK AT NC 210 NR SMITHFIELD	ups of Neuse River	35.5075	-78.4013	JOHNSTON	03020201	C NSW	M+2SM	M		M	M.	M	
J5170000	BLACK CRK AT SR 1162 BLACK CREEK RD NR FOUR OAKS	dns Holts Lake, ups Neuse River, USGS gage	35.46925	-78.45681	JOHNSTON	03020201	C NSW	M+2SM	M		M	M	M	
J5250000	NEUSE RIV AT SR 1201 RICHARDSON BRIDGE RD NR COX MILL	dns for Johnston County WWTP, ups for Progress Energy and Goldsboro WWTP, DWQ benthic station	35.3741	-78.1962	JOHNSTON	03020201	WS-IV NSW	M+2SM	M	M	M	M	M	
J5390000	HANNAH CRK AT SR 1158 ALLENS CROSSROADS DR NR BENSON	ups Benson WWTP	35.3868	78.5110	JOHNSTON	03020201	C NSW	M+2SM	M		M	M	M	
J5390800	HANNAH CRK AT SR 1227 IVEY RD NR BENSON	dns Benson WWTP	35.4025	-78.4952	JOHNSTON	03020201	C NSW	M+2SM	M		M	M	M	
J5410000	MILL CRK AT SR 1200 RICHARDSON BRIDGE RD NR BENTONVILLE	USGS gage	35.3420	-78.2162	JOHNSTON	03020201	C NSW	M+2SM	M		M	M	M	
J5500000	FALLING CRK AT SR 1219 OLD GRANTHAM RD NR GRANTHAM		35.3224	-78.1282	WAYNE	03020201	WS-IV NSW	M+2SM	M		M	M	M	
J5620000	LITTLE RIV AT SR 2333 SMITHFIELD RD NR ZEBULON		35.8577	-78.3665	WAKE	03020201	WS-II HQW NSW	M+2SM	M		M	M	M	

*Nutrients include Ammonia as N (NH_3), Nitrate/Nitrite as N (NO_2/NO_3), Total Kjeldahl Nitrogen (TKN), and Total Phosphorus as P (TP)
**Metals analysis will include the following metals: Aluminum (Al), Arsenic (As), Cadmium (Cd), Chromium (Cr) (total), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), and Zinc (Zn) - Metals monitoring was suspended per DWQ's March 2009 letter at the agreement of DWQ and LNBA
*** These nutrient and chlorophyll *a* samples shall be collected as a composite sample over the photic zone (photic zone = twice the secchi depth)
M=Monthly, M+2SM=Monthly with Twice Monthly Summer Sampling during May, June, July, August, and September. Samples are to be collected at least ten days apart except when extenuating conditions arise.
ups=upstream, dns=downstream

Table A-1 Continued LNBA Sampling Stations, Parameters and Sampling Frequency

STATION NUMBER	LOCATION	Station Comments	LATITUDE (dd.dddd)	LONGITUDE (dd.dddd)	COUNTY	8 Digit HUC	STREAM CLASS	Field Measurements (Temp, DO, pH, Conductivity)	*Nutrients	**Metals	Turbidity	Suspended Residue	Fecal Coliform	Chlorophyll a
J5690000	LITTLE RIV AT US 301 NR KENLY	ups Kenly Regional WWTP	35.5829	-78.1593	JOHNSTON	03020201	WS-V NSW	M+2SM	M		M	M	M	
J5750000	LITTLE RIV AT SR 2339 BAGLEY RD NR LOWELL MILL	dns Kenly Regional WWTP	35.5613	-78.1594	JOHNSTON	03020201	WS-V NSW	M+2SM	M		M	M	M	
J5900000	LITTLE RIV AT SR 1234 CAPPS BRIDGE RD NR CROSSROADS		35.4662	-78.0942	WAYNE	03020201	WS-IV NSW	M+2SM	M		M	M	M	
J5930000	LITTLE RIV AT NC 581 NR ASYLUM	DWQ benthic station	35.3930	-78.0258	WAYNE	03020201	C NSW	M+2SM	M		M	M	M	
J6010950	WALNUT CRK AT SR 1730 SAINT JOHNS CHURCH RD NR WALNUT CREEK	significant tributary	35.2817	-77.8686	WAYNE	03020202	C NSW	M+2SM	M		M	M	M	
J6024000	NEUSE RIV AT SR 1731 PINEY GROVE RD NR SEVEN SPRINGS	dns Goldsboro WWTP	35.2290	-77.8460	WAYNE	03020202	C NSW	M+2SM	M		M	M	M	
J6044500	BEAR CRK AT SR 1311 BEAR CREEK RD NR KINSTON	DWQ benthic and fish stations	35.2489	-77.7843	LENOIR	03020202	WS IV Sw NSW	M+2SM	M		M	M	M	
J6055000	MOSLEY CRK AT SR 1327 WILLEY MEASLEY RD NR LA GRANGE	dns LaGrange WWTP	35.3119	-77.7313	LENOIR	03020202	C Sw NSW	M+2SM	M		M	M	M	
J6150000	NEUSE RIV AT NC 11 BYPASS AT KINSTON	DWQ AMS station, ups Kinston Regional WRF	35.2587	-77.5835	LENOIR	03020202	C NSW	M+2SM	M		M	M	M	
J6250000	NEUSE RIV AT NC 55 NR GRAINGERS	dns Kinston Regional WRF, ups DuPont	35.2957	-77.4962	LENOIR	03020202	C NSW	M+2SM	M		M	M	M	
J6410000	LITTLE CRK AT NC 97 AT ZEBULON	ups Little Creek (Raleigh) WWTP	35.8279	-78.3025	WAKE	03020203	C NSW	M+2SM	M		M	M	M	
J6450000	LITTLE CRK AT NC 39 AT ZEBULON	dns Little Creek (Raleigh) WWTP	35.8125	-78.2681	WAKE	03020203	C NSW	M+2SM	M		M	M	M	
J6500000	MOCCASIN CRK AT SR 1131 ANTIOCH CHURCH RD NR CONNER		35.7301	-78.1895	WILSON	03020203	C NSW	M+2SM	M		M	M	M	
J6680000	TURKEY CRK AT SR 1101 CLAUDE LEWIS RD NR MIDDLESEX	load to Buckhorn Reservoir	35.7519	-78.1597	NASH	03020203	C NSW	M+2SM	M		M	M	M	
J6764000	CONTENTNEA CRK AT US 301 WARD BLVD NR DIXIE	ups Wilson WWTP, dns Wiggins Mill Reservoir	35.6879	-77.9477	WILSON	03020203	C Sw NSW	M+2SM	M		M	M	M	
J6890000	CONTENTNEA CRK AT SR 1622 EVANSDALE RD NR WILSON	dns Wilson WWTP	35.6429	-77.8902	WILSON	03020203	C Sw NSW	M+2SM	M		M	M	M	
J7210000	CONTENTNEA CRK AT NC 58 NR STANTONSBURG	DWQ benthic station	35.5861	-77.8111	WILSON	03020203	C Sw NSW	M+2SM	M		M	M	M	
J7240000	TOISNOT SWAMP AT SR 1539 SAND PIT RD NR STANTONSBURG	major trib to Contentnea Creek	35.5976	-77.7947	WILSON	03020203	C Sw NSW	M+2SM	M		M	M	M	
J7325000	NAHUNTA SWAMP AT NC 58 NR CONTENTNEA	major trib to Contentnea Creek	35.5081	-77.7455	GREENE	03020203	C Sw NSW	M+2SM	M		M	M	M	
J7330000	CONTENTNEA CRK AT US 13 AT SNOW HILL		35.4585	-77.6753	GREENE	03020203	C Sw NSW	M+2SM	M		M	M	M	
J7690000	LITTLE CONTENTNEA CRK AT SR 1218 CHINQUAPIN RD NR FARMVILLE	ups Farmville WWTP	35.5881	-77.5416	PITT	03020203	C Sw NSW	M+2SM	M		M	M	M	
J7740000	LITTLE CONTENTNEA CRK AT SR 1110 HWY 903 AT SCUFFLETON	ups of Contentnea Ck	35.4567	-77.4854	PITT	03020203	C Sw NSW	M+2SM	M		M	M	M	
J7850000	NEUSE RIV AT SR 1470 MAPLE CYPRESS RD NR FORT BARNWELL	dns Contentnea Creek and Contentnea MSD WWTP, DWQ AMS station, ups New Bern WWTP	35.3124	-77.3022	CRAVEN	03020202	C Sw NSW	M+2SM	M		M	M	M	M
J8870000	TRENT RIV AT SHERATON MARINA DOCK A		35.1013	-77.0412	CRAVEN	03020204	SB Sw NSW	M+2SM	M***		M	M	M	M***
J9330000	SLOCUM CRK AT SLOCUM RD AT CHERRY POINT	dns Havelock and Cherry Pt. WWTPs	34.9177	-76.9115	CRAVEN	03020204	SC Sw NSW	M+2SM	M***		M	M	M	M***

*Nutrients include Ammonia as N (NH_3), Nitrate/Nitrite as N (NO_2/NO_3), Total Kjeldahl Nitrogen (TKN), and Total Phosphorus as P (TP)

**Metals analysis will include the following metals: Aluminum (Al), Arsenic (As), Cadmium (Cd), Chromium (Cr) (total), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), and Zinc (Zn) - Metals monitoring was suspended per DWQ's March 2009 letter at the agreement of DWQ and LNBA

*** These nutrient and chlorophyll *a* samples shall be collected as a composite sample over the photic zone (photic zone = twice the secchi depth)

M=Monthly, M+2SM=Monthly with Twice Monthly Summer Sampling during May, June, July, August, and September. Samples are to be collected at least ten days apart except when extenuating conditions arise.

ups=upstream, dns=downstream

APPENDIX B- SAMPLE COLLECTION AND ANALYSIS

Sample Collection Procedures

Sample collection shall be performed by trained personnel employed with NC DWQ certified laboratories in accordance with the DWQ NPDES Discharge Monitoring Coalition Program Field Monitoring Guidance Document (May 2008) and subsequent documents. Alternate collection procedures require the approval of the DWQ coalition coordinators prior to use. Nutrient and chlorophyll-*a* samples should be collected as a composite sample from the photic zone (photic zone = twice the secchi depth) at stations J8870000 (Trent River at Sheraton Marina Dock A at New Bern) and J9330000 (Slocum Creek at Slocum Rd at Cherry Point).

Laboratory Analysis

All laboratory analyses shall be performed at a DWQ certified laboratory using approved methods as prescribed by section 40 of the Code of Federal Regulations part 136 (40CFR136) or other methods certified by the DWQ Laboratory Certification Branch (http://h2o.enr.state.nc.us/lab/cert.htm) or the Director of DWQ. 40CFR136 can be accessed on the web at http://h2o.enr.state.nc.us/lab/MethodsUpdateRuleMUR.htm.

Reporting levels will be at least as stringent as the reporting levels used by the DWQ Laboratory. For guidance purposes Table B-1 lists target reporting levels for each parameter based on the reporting levels of the DWQ Laboratory. The lowest possible analytical limits for all the parameters should be pursued.

Table B-1 DWQ Laboratory Reporting Limits

Parameters	Target Reporting Level	Comments
Water Temperature		Resolution to 0.1 degree Celsius
Dissolved Oxygen		Report results to the nearest 0.1 mg/l.
pH		Meters should be calibrated to measure a pH range of at least 4.01 to 9.18. Report results to the nearest 0.1 pH units.
Specific Conductivity		Report results to the nearest whole µmho/cm at 25 °C.

Table B-1 Continued -DWQ Laboratory Reporting Limits

Parameters	Target Reporting Level	Comments
Turbidity	1.0 NTU	
TSS	6.2 mg/L	
Fecal Coliform	1 colony/100 mL	At least 3 dilutions should be used to achieve optimum colony counts per membrane filter of 20-60 colonies.
Chlorophyll *a*	1 µg/L	Report Chlorophyll *a* values free from pheophytin and other chlorophyll pigments. Analysis by HPLC is not approved by DWQ.
Ammonia (NH_3 as N)	0.02 mg/L	Address distillation requirement. See 40CFR136 Table II footnote.
Nitrate+Nitrite as N	0.02 mg/L	
Total Kjeldahl Nitrogen as N	0.20 mg/L	
Total Phosphorus as P	0.02 mg/L	
Al	50 µg/L	
As	2 µg/L	A reporting level of 5 µg/L is acceptable.
Cd	1 µg/L	
Cr	10 µg/L	
Cu	2 µg/L	
Fe	50 µg/L	
Pb	10 µg/L	
Mn	10 µg/L	
Hg	0.2 µg/L	
Ni	10 µg/L	
Zn	10 µg/L	

Data Qualification Codes

When reporting data, the DWQ's data qualifier codes must be used to provide additional information regarding data quality and interpretation. The current set (codes are subject to change) of qualifier codes to be used is provided in Table B-2. Review the data remark codes at least annually and utilize the most current set. A copy of this table can be found at http://h2o.enr.state.nc.us/lab/qa.htm .

Table B-2 Data Remark Codes for Use with Coalition Data (current as of May 21, 2009)

Data Remark Code	Code Definition
A	Value reported is the mean (average) of two or more determinations. This code is to be used if the results of two or more discrete and separate samples are averaged. These samples shall have been processed and analyzed independently (e.g. field duplicates, different dilutions of the same sample). This code is not required for BOD or coliform reporting since averaging multiple dilutions for these parameters is fundamental to those methods.
B	Results are based upon colony counts outside the acceptable range and should be used with caution. This code applies to microbiological tests and specifically to membrane filter (MF) colony counts. It is to be used if less than 100% sample was analyzed and the colony count is generated from a plate in which the number of coliform colonies exceeds the ideal ranges indicated by the method. These ideal ranges are defined in the method as: *Fecal coliform bacteria: 20-60 colonies* *Total coliform bacteria: 20-80 colonies* B1. Countable membranes with less than 20 colonies. Reported value is estimated or is a total of the counts on all filters reported per 100 mL. B2. Counts from all filters were zero. The value reported is based on the number of colonies per 100 mL that would have been reported if there had been one colony on the filter representing the largest filtration volume (reported as a less than "<" value). B3. Countable membranes with more than 60 or 80 colonies. The value reported is calculated using the count from the smallest volume filtered and reported as a greater than ">" value. B4. Filters have counts of both >60 or 80 and <20. Reported value is a total of the counts from all countable filters reported per 100 mL. B5. Too many colonies were present; too numerous to count (TNTC). TNTC is generally defined as > 150 colonies. The numeric value represents the maximum number of counts typically accepted on a filter membrane (60 for fecal and 80 for total), multiplied by 100 and then divided by the smallest filtration volume analyzed. This number is reported as a greater than value. B6. Estimated Value. Blank contamination evident. B7. Many non-coliform colonies or interfering non-coliform growths are present. In this competitive situation, the reported coliform value may under-represent actual coliform density.
C	Total residual chlorine was present in sample upon receipt in the laboratory; value is **estimated.** Generally applies to cyanide, phenol, NH_3, TKN, coliform, and organics)

Table B-2 Data Remark Codes For Use With Coalition Data (current as of January 16, 2009)

Data Remark Code	Code Definition
G	A <u>single</u> quality control failure occurred during biochemical oxygen demand (BOD) analysis. The sample results should be used with caution. G1. The dissolved oxygen (DO) depletion of the dilution water blank exceeded 0.2 mg/L. G2. The bacterial seed controls did not meet the requirement of a DO depletion of at least 2.0 mg/L and/or a DO residual of at least 1.0 mg/L. G3. No sample dilution met the requirement of a DO depletion of at least 2.0 mg/L and/or a DO residual of at least 1.0 mg/L. G4. Evidence of toxicity was present. This is generally characterized by a significant increase in the BOD value as the sample concentration decreases. The reported value is calculated from the highest dilution representing the maximum loading potential and should be considered an **estimated** value. G5. The glucose/glutamic acid standard exceeded the range of 198± 30.5 mg/L. G6. The calculated seed correction exceeded the range of 0.6 to 1.0 mg/L. G7. Less than 1 mg/L DO remained for all dilutions set. The reported value is an **estimated** greater than value and is calculated for the dilution using the least amount of sample. G8. Oxygen usage is less than 2 mg/L for all dilutions set. The reported value is an **estimated** less than value and is calculated for the dilution using the most amount of sample. G9. The DO depletion of the dilution water blank produced a negative value.
J	**Estimated** value; value may not be accurate. This code is to be used in the following instances: J1. Surrogate recovery limits have been exceeded; J2. The reported value failed to meet the established quality control criteria for either precision or accuracy; J3. The sample matrix interfered with the ability to make any accurate determination; J4. The data is questionable because of improper laboratory or field protocols (e.g. composite sample was collected instead of grab, plastic instead of glass container) J5. Temperature limits exceeded (samples frozen or >6° C) during transport or not verifiable (e.g., no temperature blank provided);, non-reportable for NPDES compliance monitoring. J6. The laboratory analysis was from an unpreserved or improperly chemically preserved sample. The data may not be accurate. J7. This qualifier is used to identify analyte concentration exceeding the upper calibration range of the analytical instrument/method. The reported value should be considered estimated. J8. Temperature limits exceeds (samples frozen or >6°C during storage. The data may not be accurate. J9. The reported value is determined by a **one-point estimation** rather than against a regression equation. The estimated concentration is less than the laboratory practical quantitation limit and greater than the laboratory method detection limit. J10. Unidentified peak; estimated value. J11. The reported value is determined by a **one-point estimation** rather than against a regression equation. The estimated concentration is less than the laboratory practical quantitation limit and greater than the laboratory method detection limit. *This code is used when an MDL has not been established for the analyte in question.* J12. The calibration verification did not meet the calibration acceptance criterion for **field parameters.** <u>Note</u>: A "J" value shall not be used if another code applies (ex. N, V, M).

Table B-2 Data Remark Codes For Use With Coalition Data (current as of January 16, 2009)

Data Remark Code	Code Definition
M	Sample and duplicate results are "out of control." The sample is non-homogenous (e.g. VOA soil). The reported value is the lower value of duplicate analyses of a sample.
N	Presumptive evidence of presence of material; **estimated** value. This code is to be used if: N1. The component has been tentatively identified based on mass spectral library search; N2. There is an indication that the analyte is present, but quality control requirements for confirmation were not met (i.e., presence of analyte was not confirmed by alternate procedures). N3. This code shall be used if the level is too low to permit accurate quantification, but the **estimated** concentration is less than the laboratory practical quantitation limit and greater than the laboratory method detection limit. *This code is not routinely used for most analyses.* N4. This code shall be used if the level is too low to permit accurate quantification, but the estimated concentration is less than the laboratory practical quantitation limit and greater than the instrument noise level. *This code is used when an MDL has not been established for the analyte in question.* N5. The component has been tentatively identified based on a retention time standard.
P	Elevated practical quantitation limit (PQL)* due to matrix interference and/or sample dilution.
Q	Holding time exceeded. These codes shall be used if the value is derived from a sample that was received, prepared and/or analyzed after the approved holding time restrictions for sample preparation and analysis. The value does not meet NPDES requirements. Q1. Holding time exceeded prior to receipt by lab Q2. Holding time exceeded following receipt by lab
S	Not enough sample provided to prepare and/or analyze a method-required matrix spike (MS) and/or duplicate (MSD).
U	Indicates that the analyte was analyzed for but not detected above the reported practical quantitation limit (PQL)*. The number value reported with the "U" qualifier is equal to the laboratory's PQL*.
V	Indicates the analyte was detected in both the sample and the associated method blank. Note: The value in the blank shall not be subtracted from the associated samples.
X	Sample not analyzed for this constituent. This code is to be used if: X1. Sample not screened for this compound. X2. Sampled, but analysis lost or not performed-field error X3. Sampled, but analysis lost or not performed-lab error
Y	Elevated PQL* due to insufficient sample size
Z	The presence or absence of the analyte cannot be verified. The sample analysis/results are not reported due to: Z1. Inability to analyze the sample. Z2. Questions concerning data reliability.

*PQL The Practical Quantitation Limit (PQL) is defined as the lowest level achievable among laboratories within specified limits during routine laboratory operation. The Practical Quantitation Limit (PQL) is "about three to five times the method detection limit (MDL) and represents a practical and routinely achievable detection level with a relatively good certainty that any reported value is reliable." (APHA, AWWA, WEF. 1992. Standard Methods for the Examination of Water and Wastewater, 18th ed.)

APPENDIX C - DATA FORMAT AND REPORTING REQUIREMENTS

Data Format for Monthly submittals

Table C-1 provides the required data submittal spreadsheet format with sample data. Do not use commas, tabs, pipes or other common file delimiters anywhere in the table. The first row should contain the column headings only. Column headings must include appropriate information on measurement units (mg/l, µg/l, cfu/100ml, etc.). The second row must contain the method code. It is very important that the format of the headings and the number and order of columns is consistent among all monthly submissions. The DWQ station number must be provided (e.g. B6140000). An additional column containing the location description is acceptable as long as it is consistently included. Include a comment column for describing pertinent information related to the sampling event or specific samples. Ensure no missing values for station, date, time, and depth. Place all remark codes in a separate column as demonstrated in Table C-1. If there is no result for a particular parameter leave the cell blank. Screen all data for inappropriate or improbable values, such as a pH of 21.2.

Annual Report

The LNBA will be required to submit an annual report by April 30th for each year the MOA is in effect. The annual report will summarize all data collected in the past calendar year and contain the following elements:

- Monitoring Station List to include station number, station description, county, accurate coordinates (in decimal degrees to 4 decimal places), stream classification, and 8 digit hydrologic unit code (HUC).
- List of all certified laboratories that conducted work for the coalition in the past year. Identify time frames for all laboratories and analysis methods used during the year. Summarize any laboratory certification issues for individual parameters.
- Submit a CD that includes all monitoring data for the past year with a statistical summary for each station. These data should be combined into a single table containing the year's reviewed and finalized data. The annual statistical summary must describe for each parameter at each location:
    - Number of observations (N)
    - Number of observations less than the laboratory reporting level (N<RL)
    - Identify the water quality standard, action level, or other reference level (Ref)
    - Identify the number of observations that do not meet the reference level (N>Ref) or (N<Ref)
    - Maximum observed value (Max) and Minimum observed value (Min)
    - Annual arithmetic mean value (except for fecal coliform where geometric mean values should be calculated and pH)
- Include a list of active LNBA members with authorized representative updates, contact names, email addresses and phone numbers. Identify the facility name and permit number.
- Provide a list of members that are no longer active in the LNBA and their permit numbers.
- Provide a list of changes in members' names, ownerships, and discharge locations.
- Summarize all quality assurance and quality control issues and any field audits conducted.
- Summarize any significant issues, special studies, or projects.
- Describe any required data collection that was missed and provide an explanation.
- Review and update the monitoring program and suggest potential MOA modifications.
- Provide the Coalition's Website Address.

Table C-1 File Format For Coalition Data Reporting

Station	Date (m/d/yyyy)	Time (hh:mm)	Depth (m)	Temp (°C)	Temp_rmk	DO (mg/l)	DO_rmk	pH (su)	pH_rmk	Conductivity (µS/cm)	Conductivity_rmk	Fecal Coliform	Fecal Coliform_rmk	Suspended Residue (mg/l)	Suspended Residue_rmk	Turbidity (NTU)	Turbidity_rmk	Chlorophyll a (µg/l)	Chlorophyll_rmk	NH3_N (mg/l)	NH3_N_rmk	TKN_N (mg/l)	TKN_N_rmk	NO2_NO3_N (mg/l)	NO2_NO3_N_rmk	TP_P (mg/l)	TP_P_rmk
				10	10 rmk	300	300 rmk	400	400 rmk	94	94 rmk	31616	31616 rmk	530	530 rmk	82079	82079 rmk	32230	32230 rmk	610	610 rmk	625	625 rmk	630	630 rmk	665	665 rmk
A1234567	8/19/2002	15:30	0.1	25.2		7.8		6.9		133		110		45		22		23	Q1	0.1		0.2		0.3			
B9876543	8/20/2002	11:50	0.1	27.2		7.1		7.2		125		30		4		5.6		5		0.14		0.6		0.31			
B9876543	8/20/2002	11:50	1	28		6.5		7		122																	
B9876543	8/20/2002	11:50	2	25		6.7		6.9		119																	
B9876543	8/20/2002	11:50	3	17		5.5		6.7		120																	
C1357924	8/21/2002	16:10	0.1	22.1		3.1		6.2		233		15	B1	55		11											
C0246813	9/1/2002	9:30	0.1	19.7		8.3		7		99		6000	B5	410		36				0.26		0.4		0.57			
C0246813	10/1/2002	11:30	0.1	12		8.9		7.3		115		1200	B3	95	A		X3			0.16	J2	0.2		0.09			

The reporting format table continues with metals and comment columns on the next page.

Table C-1 Continued. File Format For Coalition Data Submittals

Cadmium, Cd (µg/l)	Cadmium, Cd_rmk	Chromium, Cr (µg/l)	Chromium, Cr_rmk	Copper, Cu (µg/l)	Copper, Cu_rmk	Nickel, Ni (µg/l)	Nickel, Ni_rmk	Lead, Pb (µg/l)	Lead, Pb_rmk	Zinc, Zn (µg/l)	Zinc, Zn_rmk	Aluminum, Al (µg/l)	Aluminum, Al_rmk	Iron, Fe (µg/l)	Iron, Fe_rmk	Manganese, Mn (µg/l)	Manganese, Mn_rmk	Arsenic, As (µg/l)	Arsenic, As_rmk	Mercury, Hg (µg/l)	Mercury, Hg_rmk	Comments
1027	1027 rmk	1034	1034 rmk	1042	1042 rmk	1067	1067 rmk	1051	1051 rmk	1092	1092 rmk	1105	1105 rmk	1045	1045 rmk	1055	1055 rmk	1002	1002 rmk	71900	71900 rmk	
130		11		3		27		4.4		610		10				0.21		12		12		
120		10	U	2	U	25	U	2	U	510		10	U	10	U	0.2	U	10	U	10	U	
																						Secchi depth 1.2 meters
333		10	U	2	U	25	U	2	U	624		10	U	10	U	0.2	U	10	U	10	U	Nutrient Sample Spilled
120		10	U	2	U	25	U	2	U	510		10	U	10	U	0.2	U	10	U	10	U	2.5" of rain on 8/31/2002
120		10	U	2	U	25	U	2	U	510		10	U	10	U	0.2	U	10	U	10	U	

TN0028827
GMDa

HISTORIC
FRANKLIN
TENNESSEE

June 9, 2011

Michael R. Thornton
Tennessee Department of Environment & Conservation
Division of Water Pollution Control
711 R. S. Gass Boulevard
Nashville TN 37216

Dear Mr. Thornton,

In February 2011 Vic Bates, Superintendent of the Franklin Water Reclamation Facility suddenly passed away and I (Juan Davis) assumed his responsibilities. In November 2010 we received a new NPDES Permit. In the May 2011 DMR's I noticed that we were supposed to start reporting Insoluble TKN and Insoluble Phosphorus. I immediately called Jessica Murphy and asked for advice because I thought that everything we were to test for was already arranged with ESC Lab Sciences by Mr. Bates. When I contacted Janet Hensley at ESC she informed me that she and Vic talked and passed several emails regarding this issue but she never received a final request from Vic to start sampling for these parameters. In Vic's passing we were left with a lot of unanswered questions, with one being the status of a lot of things regarding state issues. I sincerely apologize for the failure to monitor for these parameters in May, 2011. I have spoken with ESC and informed them to start immediately testing and if it was known that Vic did not follow – up on this I would have resolved this issue before we mistakenly failed to monitor for it. In response to how to prevent something like this from happening again I am committing myself to reading our permit from front to back to. I am new to this position and hope to gain the same trust and creditability that Mr. Bates had with State of Tennessee Officials. I humbly ask for forgiveness for this unfortunate mistake.

Sincerely, Juan R. Davis

Juan Davis

RECEIVED
JUN 16 2011
TN Division Of Water Pollution Control

cc: Jessica Murphy – TDEC
Gary Davis – TDEC
Mark Hilty – City of Franklin, Water Management Director

135 Claude Yates Dr. • Franklin TN 37064 • (615) 791-3240 phone • (615) 791-3208 fax

Juan Davis

From: Janet Hensley [JHensley@esclabsciences.com]
Sent: Thursday, June 09, 2011 9:51 AM
To: Juan Davis
Subject: FW: Rates on New Tests

Juan, this looks like the last email I received from Vic concerning the Ultimate Bod even thou never did request testing. I did not recieve a final request for the Insoluble TKN & Phos.

Janet Hensley
Technical Service Rep
800-767-5859 ext 9665
www.esclabsciences.com
E.S.C. Lab Sciences

From: Danny Ramsey
Sent: Tuesday, January 25, 2011 11:13 AM
To: Janet Hensley; Eric Johnson; Tom Mellette
Subject: FW: Rates on New Tests

See below. "We are going to do these endeavors" looks like an affirmative response to me.

From: Vic Bates [mailto:vicb@franklintn.gov]
Sent: Wednesday, December 01, 2010 7:25 AM
To: Danny Ramsey
Subject: RE: Rates on New Tests

Danny,
We are going to do these endeavors.
The first thing I need from you is dealing with the UCBOD.
I need you to send me your procedure for the UCBOD.
I have to forward this to Gary Davis for their "Blessing".
We will deal with the other items after this. The soluble/insoluble
Is later on.
Thanks
Vic

RECEIVED
JUN 16 2011
TN Division Of Water Pollution Control

om: Danny Ramsey [mailto:DRamsey@esclabsciences.com]
ent: Monday, November 29, 2010 1:23 PM
To: Vic Bates
Cc: Janet Hensley
Subject: Rates on New Tests

Vic,

As discussed, here are the rate differences for the additional tests.

1. Dissolved TKN and Dissolved Phosphorus will require a setup fee of $600. This is due to necessity of purchasing a unique type of filter, as specified per your previous email, and specific glassware needed for filter apparatus setup.

2. Additional $10 per sample analyte for dissolved analysis.

3. Additional $10 per sample analyte for reporting of soluble result.

4. Regarding Ultimate BOD (120 day), price per sample will be $750. One additional point of information about this test is that this general practice is that test incubates for 120 days or until 2 successive days of 0 depletion are realized.

We appreciate your patience while we researched this and we look forward to continuing to serve as a laboratory resource for you. Please let us know if you wish for us to proceed with setup or if you have additional questions.

Thanks,

Danny Ramsey
ESC

Notice: This communication and any attached files may contain privileged or other confidential information. If you have received this in error, please contact the sender immediately via reply email and immediately delete the message and any attachments without copying or disclosing the contents. Thank you.

y of Franklin question

ın Richard [brichard@empirlabs.com]

: Thursday, June 21, 2012 10:10 AM

Gary Davis

lo Gary,

ɔd talking to you this morning...just wanted to follow-up with an e-mail to make sure I have everything clear ıut the insoluble TKN and insoluble Phos. required for the City of Franklin permit. Could you please explain ɪt is needed again, so we don't have any questions about these two parameters?

ınks,

ɪn

.ASE NOTE: Our laboratory will be closed on Wednesday, July 4th for the Independence Day Holiday. We will resume ɘpting shipments/coolers on Thursday, July 5th.

an Richard

ject Manager

ıpirical Laboratories, LLC

ur National Small Business Partner"

Mainstream Drive, Suite 270 I Nashville, TN 37228 I Website I Map & Directions

n: 615.345.1115 ext. 249 I Toll free: 877.345.1113 I Fax: 866.417.0548

ɘbrating 45 years of excellence, Empirical Laboratories is certified as a Woman-Owned Small Business and a Small ıdvantaged Business. Come visit our website at http://www.empirlabs.com today.

·y Davis - RE: New Permit Requirements (Permit #TN0028827)

m: Vic Bates <vicb@franklintn.gov>
"'Dunn, Mike'" <Mike.Dunn@testamericainc.com>
:e: 11/19/2010 6:32 AM
ıject: RE: New Permit Requirements (Permit #TN0028827)
: Mark Hilty <mark.hilty@franklintn.gov>, 'Byron Ross' <byron@mmsontheweb.com>, "'gary.davis@tn.gov'" <gary.davis@tn.gov>, 'Bo Butler' <bbutler@ssr-inc.com>, Wayne Davenport <wayned@franklintn.gov>

---

e,
ppreciate you getting back with me concerning these requests.
ıD ultimate is what is needed not CBOD.
:he second issue I think (not sure) that Gary Davis had indicated
sibly something different than a 0.45 um filter. Not being familiar
h this procedure, I do not what to be absolute on this part. If possible,
ıld you be able to obtain clarification on this part by Gary Davis?
ems that you possibly have a option on the CBOD ultimate so these
er items may fall in line with that.
nks

---

m: Dunn, Mike [mailto:Mike.Dunn@testamericainc.com]
ıt: Thursday, November 18, 2010 5:19 PM
Vic Bates
Connor, Roxanne; Johnson, Andy
ıject: RE: New Permit Requirements (Permit #TN0028827)

ultimate cBOD is very unusual. Please confirm that a 5 day cBOD isn't what is needed. If the ultimate cBOD is needed, our PM search our network for a lab with capability. I believe the approach to run total and dissolved with the difference being called ıluble would be valid. The lab would filter through a 0.45 um pore size filter per standard EPA criteria for dissolved target ıpounds.

:E DUNN
hnical Director

stAmerica
LEADER IN ENVIRONMENTAL TESTING

0 Foster Creighton Drive
shville, TN 37204
615.301.5758 | TollFree 800.765.0980
v.testamericainc.com

ım: Vic Bates [mailto:vicb@franklintn.gov]
ıt: Thursday, November 18, 2010 11:02 AM
Dunn, Mike
Mark Hilty; Wayne Davenport; 'Byron Ross'; 'Gary Davis'
ıject: New Permit Requirements (Permit #TN0028827)
portance: High

Dunn,
was glad to have an opportunity to talk with you concerning our
rent operating permit (NPDES). The State of Tennessee has added
v requirements to our permit effective November 01, 2010. The following
additional requirements:

(ultimate) Summer annual frequency 1/year composite effluent
ıble TKN as N Summer (May through October) 2/month composite effluent
ıble Total Phosphorus as P Summer (May through October) 2/month composite effluent

larification on the insoluble parameters includes a possible request to analyze for Total and
ıved TKN (the difference would be Insoluble TKN) and Total and Dissolved Phosphorus (the
ence would be Insoluble Phosphorus). The samples would be filtered through Whatman 934 AH filters.

ld suggest any questions being directed to Mr. Gary Davis (TDEC) for official verification.
forward to your response.

ks,

ates
rintendent
ıf Franklin
P
laude Yates Drive
lin, Tenn. 37064
e#615-791-3240
615-791-3208
l: vicb@franklintn.gov

'y Davis - New Permit Requirements (Permit #TN0028827)

m: Vic Bates <vicb@franklintn.gov>
"'mike.dunn@testamericainc.com'" <mike.dunn@testamericainc.com>
e: 11/18/2010 11:02 AM
ject: New Permit Requirements (Permit #TN0028827)
: Mark Hilty <mark.hilty@franklintn.gov>, Wayne Davenport <wayned@franklintn.gov>, 'Byron Ross' <byron@mmsontheweb.com>, 'Gary Davis' <Gary.Davis@tn.gov>

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ıks,

Vic Bates

Bates
erintendent
of Franklin
TP
Claude Yates Drive
ıklin, Tenn. 37064
ne#615-791-3240
: 615-791-3208
il: vicb@franklintn.gov

From: Vic Bates <vicb@franklintn.gov>
To: "'gary.davis@tn.gov'" <gary.davis@tn.gov>
CC: 'Mike Thornton' <mike.thornton@tn.gov>, 'Danny Ramsey' <DRamsey@esclabsc...
Date: 11/22/2010 11:11 AM
Subject: FW: ESC Lab Sciences Report for PASS THROUGH Monthly Effluent Pass Through L488014

Gary,
Are you in agreement with this level that they are indicating?
Thanks
Vic

-----Original Message-----
From: Janet Hensley [mailto:JHensley@esclabsciences.com]
Sent: Monday, November 22, 2010 9:33 AM
To: Vic Bates
Subject: RE: ESC Lab Sciences Report for PASS THROUGH Monthly Effluent Pass Through L488014

Your cyanide result is "U" which means undetected. You can report the MDL which would be <0.0010.

Janet Hensley
Technical Service Rep
800-767-5859 ext 9665
Local 615-773-9665
www.esclabsciences.com

-----Original Message-----
From: Vic Bates [mailto:vicb@franklintn.gov]
Sent: Monday, November 22, 2010 8:44 AM
To: Janet Hensley
Subject: RE: ESC Lab Sciences Report for PASS THROUGH Monthly Effluent Pass Through L488014

Janet,
Our monthly average limit for Cyanide is 0.00478 mg/L.
We will be reporting this on a monthly.
Thanks
Vic

-----Original Message-----
From: Janet Hensley [mailto:jhensley@esclabsciences.com]
Sent: Monday, November 22, 2010 8:38 AM
To: Vic Bates
Subject: ESC Lab Sciences Report for PASS THROUGH Monthly Effluent Pass

Through L488014

Thank for you choosing ESC Lab Sciences! Please find enclosed PDF files containing your laboratory analysis and chain of custody.

ESC is leading the laboratory industry with our On-line Data Management tools. Please contact your Technical Service Representative to learn how to create historical Excel tables or access data in real time using powerful and intuitive software that is only available at http://www.esclabsciences.com.

Visit ESC's secure data management web site - myESC - for all your reporting and data management needs at https://myesc.esclabsciences.com.

ESC ... "Your Lab of Choice"

Janet Hensley
Technical Service Representative
615-773-9665

ESC Lab Sciences
12065 Lebanon Rd
Mt. Juliet, TN 37122

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Gary Davis

From: Dorie Bolze <DorieBolze@harpethriver.org>
Sent: Friday, July 26, 2013 3:59 PM
Subject: Proposed Harpeth River Continuous Dissolved Oxygen Monitoring Study for 2013
Attachments: Harpeth River proposed Dissolved Oxygen continuous monitoring study for 2013.pdf

TO: TDEC, USGS, EPA Region IV, USFWS, and TWRA, city of Franklin, Berry's Chapel Utility and Cartwright Creek Utility

As you all know, HRWA has been working on pulling together a comprehensive monitoring plan for the Harpeth River watershed and establishing a Technical Advisory Committee to steer its implementation. HRWA circulated a draft monitoring plan in February along with a compilation of the dissolved oxygen data that is diurnal and/or continuous that has been gathered on the Harpeth since 2000 among other material as part of our contribution to efforts to improve the water quality in the Harpeth River.

The most critical time during the summer low-flow season in the Harpeth is coming up in August-September. In the spirit of conducting monitoring as part of a comprehensive plan that is managed under the guidance of the Technical Advisory Committee (TAC), HRWA is submitting this continuous monitoring plan for dissolved oxygen and other parameters in order to collect needed data this upcoming low-flow summer season between August and September. HRWA has contacted an independent contractor, Tetra Tech, to prepare this three-week continuous monitoring study based on the current permit requirements in the city of Franklin permit and in the recent draft permit for the city and the other two sewage treatment plants that discharge into the Harpeth in Williamson County.

Please see the attached proposed continuous monitoring plan for this summer for a total cost of $18,500. We welcome your input so the study will be of value for future river modeling work and is part of the monitoring data gathered as part of a comprehensive plan. Since the monitoring study for this summer will need to begin shortly, it would be great to gather your input by August 1 on:
Location of the four monitoring locations,
Methodology
and funding.

HRWA is currently seeking funding for this so that we can assist in have this monitoring study conducted this summer. Let us know how else we can help with this important effort.

Dorie

Dorie
Dorie Bolze
Executive Director
Harpeth River Watershed Association
P.O. Box 1127
Franklin, TN 37065
615-479-0181 (mobile)
615-790-9767
www.harpethriver.org
Street address:
215 Jamestown Park
Brentwood, TN 37027

Gary Davis

From: Michelle Barbero <MichelleBarbero@harpethriver.org>
Sent: Thursday, August 15, 2013 9:08 AM
To: Ming.Chen Shiao; Dorie Bolze; Shannon Williams (swilliam@usgs.gov); Sherry Wang; William Melville (Melville.William@epa.gov)
Cc: Gary Davis; Jimmy R. Smith; Alexandra Ewing
Subject: RE: DO monitoring paperwork

I agree completely. With this unusually wet and cool summer, we would not get an 'realistic' reading on the river. While all data is good data and great to have, we do have limited resources for monitoring at this time. I am extremely happy that we are all talking and moving in the same direction, even the permitees! This is a very important step in the right direction.

Recent DO data: Metro Water Services is currently monitoring the Harpeth River Watershed in Davidson county. I have looked through their water quality data from the Harpeth River in Davidson County and see the following:

Date	Time	Watershed	Site Name	Samplers (initials)	DO %	DO mg/L	Conductivity	Temperature C	pH
7/24/2013	1045	Harpeth	Harpeth 1	VM/TD	80.6	6.69	401.1	25.1	7.6
7/24/2013	1100	Harpeth	Little Harpeth	VM/TD	101.8	8.69	503	23.2	7.8
7/24/2013	1030	Harpeth	Trace Creek	VM/TD	83.5	7.31	605	21.8	7.4
7/24/2013	940	Harpeth	Harpeth 2	VM/TD	72.5	5.87	419.4	25.5	7.7
7/18/2013	845	Harpeth	Trace Creek	VM/TD	63.8	5.5	653	22.1	7.1
7/18/2013	815	Harpeth	Harpeth 2	VM/TD	72	5.7	431.2	26.5	7.6
7/18/2013	905	Harpeth	Little Harpeth	VM/TD	89.2	7.53	526	23.7	7.8
7/18/2013	937	Harpeth	Harpeth 1	VM/TD	77	6.28	422.2	26.1	7.6
7/17/2013	845	Harpeth	Harpeth 2	VM/TD	72.2	5.81	429.7	25.6	7.5
7/17/2013	950	Harpeth	Little Harpeth	VM/TD	99.8	8.54	534	23.2	<N
7/17/2013	935	Harpeth	Harpeth 1	VM/TD	79.8	6.53	420.7	25.5	<N
7/17/2013	915	Harpeth	Trace Creek	VM/TD	60.5	5.3	655	21.8	<N
7/16/2013	1250	Harpeth	Harpeth 1	<Null>	90.5	7.24	417.5	25.6	7.6
7/16/2013	1230	Harpeth	Trace Creek	SW	87.8	7.39	658	23.9	7.1
7/16/2013	1330	Harpeth	Little Harpeth	SW	104.9	8.87	524	24.3	7.9
7/16/2013	1200	Harpeth	Harpeth 2	SW	85.6	7	432.3	25.5	7.5

~Michelle Barbero
Watershed Science/Restoration Program Manager
Harpeth River Watershed Association

From: Ming.Chen Shiao [mailto:Ming.Chen.Shiao@tn.gov]
Sent: Wednesday, August 14, 2013 9:27 AM
To: Dorie Bolze; Shannon Williams (swilliam@usgs.gov); Michelle Barbero; Sherry Wang; William Melville (Melville.William@epa.gov)

c: Gary Davis; Jimmy Smith (Jimmy.R.Smith@state.tn.us)
ubject: RE: DO monitoring paperwork

'orie,

'ata collected under high flow conditions are not very useful. Also, cross section measurement under high flow onditions may have safety issues. NOAA's long term forecast is still wet in Aug-Sep-Oct. May have to wait until next ummer, if possible.

1ing

'rom: Dorie Bolze [DorieBolze@harpethriver.org]
;ent: Tuesday, August 13, 2013 12:05 PM
'o: Shannon Williams (swilliam@usgs.gov); Michelle Barbero; Ming.Chen Shiao; Sherry Wang; William Melville Melville.William@epa.gov)
:c: Gary Davis; Jimmy Smith (Jimmy.R.Smith@state.tn.us)
;ubject: FW: DO monitoring paperwork

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Also, as of this point, the city of Franklin, and Cartwright Creek will be able to contribute funding, and Berry's :hapel utility is hoping to but has to get approval from their board. HRWA will fund the remainder.

The intent is to start the week of August 26. Thus this week, we are getting the paperwork in place with 'etraTech.

But, as you all know, the weather has been unusual this year—wet and cool. All 3 sewer permittees, TDEC and ›thers have asked that question so HRWA and USGS reviewed the data and discussed this. The plan this week, os to get ;ome grab samples and temperature readings in the early morning at several locations in the Franklin once the ıydrograph drops down after the rains. Who wants to bet on when that will be!??

So, the Notice to Proceed, is based on the conditions this year. I will provide the grab data we collect, hopefully ater this week, for the final decision.

If you have a moment TODAY or Wed, please review this detailed description of the Scope of Work and let me ‹now if you see something that needs clarifying.

Thank you!!

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www.harpethriver.org
Street address:
215 Jamestown Park
Brentwood, TN 37027

Protecting and Restoring the State Scenic Harpeth River and Clean Water in TN since 1999.

From: Bambic, Dustin [mailto:Dustin.Bambic@tetratech.com]
Sent: Monday, August 12, 2013 3:21 PM
To: Dorie Bolze
Cc: Ward, Tim
Subject: DO monitoring paperwork

Hi Dorie. Hope you had a good weekend. Attached is the paperwork for the DO monitoring.

You'll notice in the last section that execution of this agreement has two parts:

1. Sign the agreement
2. Send an email with a Notice to Proceed.

This will allow us to get the paperwork completed while you're waiting to pull the trigger.

Let us know which questions you have. Thanks, Dustin

Dustin Bambic, PH | Director, Water Resources | **Tetra Tech**
Direct: 615.252.4795 | Mobile: 615.618.2380 | Fax: 615.254.4507
dustin.bambic@tetratech.com

Gary Davis

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Direct: 615.252.4795 | Mobile: 615.618.2380 | Fax: 615.254.4507
dustin.bambic@tetratech.com

Gary Davis

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To: Shannon Williams (swilliam@usgs.gov); Michelle Barbero; Ming.Chen Shiao; Sherry Wang; William Melville (Melville.William@epa.gov)
Cc: Gary Davis; Jimmy Smith (Jimmy.R.Smith@state.tn.us)
Subject: FW: DO monitoring paperwork
Attachments: HRWA_Harpeth River Monitoring_Proposal_Aug2013.pdf

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ustin Bambic, PH | Director, Water Resources | **Tetra Tech**
irect: 615.252.4795 | Mobile: 615.618.2380 | Fax: 615.254.4507
ustin.bambic@tetratech.com

TETRA TECH, INC.

August 12, 2013

Ms. Dorie Bolze
Harpeth River Watershed Association
P.O. Box 1127
Franklin, Tennessee 37065

Subject: **Harpeth River Water Quality Monitoring**
Williamson and Davidson County, Tennessee

Dear Ms. Bolze:

Tetra Tech, Inc. (Tetra Tech) is pleased to present the Harpeth River Watershed Association (HRWA) a proposal for water quality monitoring at four locations on the Harpeth River, located in Williamson and Davidson Counties, Tennessee. Based on information supplied by HRWA, Tetra Tech has prepared the following scope of work (SOW):

SCOPE OF WORK

The proposed SOW is for approximately three weeks of continuous surface water quality monitoring at four locations along the Harpeth River. The locations were provided by HRWA and are based on the following: a draft monitoring plan prepared by HRWA; historical data collection sites used by the U.S. Environmental Protection Agency (EPA), Tennessee Department of Environment and Conservation (TDEC), HRWA, discharge permittees, and others; and U.S. Geologic Study (USGS) gauge stations. The four proposed monitoring locations are as follows:

1. Highway 96 bridge, USGS gauge station
2. Cotton Road bridge, no USGS gauge station
3. Old Hillsboro Road bridge, no USGS gauge station
4. Highway 100 bridge, USGS gauge station

The following tasks comprise the SOW.

Task 001 – Project Setup and Preparation of QAPP/SOP and HASP

Tetra Tech will modify the existing TDEC Division of Water Pollution Control (WPC) *Quality System Standard Operation Procedure (SOP) for Chemical and Bacteriological Sampling of Surface Water*, dated August 2011, to develop a Quality Assurance Project Plan (QAPP)/SOP for the proposed Harpeth River monitoring.

Tetra Tech will prepare a site-specific health and safety plan (HASP) for the project to address safety issues associated with the installation of the water quality monitoring sondes and semi-weekly data collection. The HASP will be prepared to ensure that safe working conditions exist at the sites during these activities. The elements of the HASP will be based on the requirements described in the Occupational Safety and Health Administration (OSHA) rules (29 Code of Federal Regulations [CFR] 1910). The plan will address the

712 Melrose Avenue Nashville, TN 37211
Tel (615) 254-4559 Fax (615) 254-4507
www.tetratech.com

potential hazards associated with the field activities and the personnel protection measures selected in response to these hazards.

This task will also include project setup activities and preparation/purchase of sonde installation materials.

Task 002A – Multi-Parameter Sonde Rental and Installation

Tetra Tech will rent four YSI 6920-V2 Multi-Parameter sondes from Pine Environmental Services Inc. and install the units at the four proposed locations identified previously. The sondes will be placed in a protective Schedule 80 polyvinlyl chloride (PVC) casing, which will be affixed to a metal post driven into the stream bed, according to the TDEC WPC SOP. The PVC casing will be perforated at the casing bottom for a flow-through design. The sondes will be secured using galvanized steel cable, to facilitate raising or lowering the sonde due to changes in river depth/flow.

The sondes will be placed near mid-stream, at mid-depth. Tetra Tech will attempt to minimize the visibility of the sondes, in an effort to reduce impacts to the river aesthetics and to reduce potential device tampering and/or vandalism.

Task 002B – Water Quality Monitoring

The proposed monitoring period is three (3) weeks from the time of installation. The sondes will perform continuous monitoring using an internal data logger for the following parameters:

- Depth,
- Conductivity,
- Temperature,
- Dissolved Oxygen (DO), and
- Turbidity

Tetra Tech will visit each location during one day, twice per week to download the sonde data. The TDEC SOP for long term DO monitoring will be followed for data collection procedures. During each visit, Tetra Tech will also perform sonde calibration and parameter crosschecks using a YSI 556 Multi-Parameter instrument and a Lamotte 2020 turbidity meter. Three channel cross sections will be measured once at the beginning and once at the end of the monitoring period at each of the four locations. The cross section locations include upstream of the sonde location, at the sonde location, and a downstream location. If necessary, equipment adjustments and/or repair will be conducted during the semi-weekly visits. Field data forms, consisting of parameter logs, crosscheck data forms, and calibration logs, will be prepared during each site visit. During the final semi-weekly visit, the sondes and mounting materials will be removed.

Task 003 – Technical Memorandum

Tetra Tech will prepare a brief technical memo summarizing the project results. The memo will include:

- Summary of field activities and observations;
- Figure depicting monitoring locations;
- Field data summary table;
- DO field data summary table with comparison to TDEC DO criteria;

712 Melrose Avenue, Nashville, TN 37211
Tel (615) 254-4559 Fax (615) 254-4507
www.tetratech.com

- Data graphs; and
- Flow data from upstream and downstream USGS gauge stations to estimate flow rates at the monitoring locations with no USGS gauge station.

It is estimated that the technical memo will be available approximately 15 business days following the last monitoring visit.

ASSUMPTIONS

- The proposed cost is based on the SOW provided here. Alterations to the SOW, either by HRWA or a regulatory party, may affect project cost;
- HRWA will obtain access agreements if access to monitoring locations is restricted due to private property;
- Tetra Tech will not be responsible for data loss or unusable data due to loss of sondes, equipment failure, monitoring location access restrictions, drought conditions, or flooding; and
- Accessibility for personnel and equipment on-site will not be hampered by site-, earthquake-, or weather-related conditions;

Cost

Tetra Tech has estimated the lump sum total cost, based on the SOWs as described in this document, at $19,500. The cost estimate will not be exceeded without prior approval.

We can begin this project upon receiving your authorization to proceed. To expedite this project, please send a copy of the attached agreement, signed, by facsimile to (615)-254-4507. After execution of the agreement, work will not begin (no costs will be incurred) until an electronic Notice To Proceed is provided to Tetra Tech from HRWA.

We appreciate the opportunity to provide this proposal of services for your consideration. If you have any questions concerning these services or require adjustment to our approach or schedule please do not hesitate in contacting Mr. Tim Ward at (615) 252-4791 or tim.ward@tetratech.com.

Our payment terms are net due thirty (30) days from the date of the invoice, regardless of the status of the case. Interest at the rate of 1.5% per month will be charged on balances not paid within thirty days.

Sincerely,

Tetra Tech, Inc.

Tim Ward

Tim D. Ward
Environmental Scientist

Attachments
Tetra Tech Professional Services Contract

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

PROJECT:	Harpeth River Monitoring	**TETRA TECH, INC. TIN:**	95-4148514		
CLIENT:	Harpeth River Watershed Association (HRWA)				
ADDRESS:	P.O. Box 1127, Franklin, Tennessee 37065				
INVOICING ADDRESS:	P.O. Box 1127, Franklin, Tennessee 37065				
PROJECT CONTACT:	Dorie Bolze	**TEL:**	410.513.8727	**FAX:**	410.642.7101
PAYMENT CONTACT:	Dorie Bolze	**TEL:**	410.513.8727	**FAX:**	410.642.7101
CONSULTANT:	**TETRA TECH, INC.**				
ADDRESS:	712 Melrose Avenue				
	Nashville, TN 37211				
TECHNICAL CONTACT:	Tim Ward	**TEL:**	615-252-4791	**FAX:**	615-254-4507
Contractual CONTACT:	Ron Grover	**TEL:**	615.252.4790	**FAX:**	615.254.4507
PAYMENT ADDRESS:	**Tetra Tech, Inc., PO 901642, Denver, CO 80291-1642.**				
PROJECT DESCRIPTION:	Perform three week surface water quality monitoring of 4 locations on the Harpeth River				

☒ **SCOPE OF SERVICES/PERIOD OF PERFORMANCE (See Attachment)**

☐ **PRICE SCHEDULE (See Attachment)**

TERMS AND CONDITIONS

1. DEFINITIONS AND CONTRACT FORMATION.

(a) **"Client"** shall mean the person or entity identified in the Tetra Tech, Inc. "TT" Proposal for whom Services are to be performed.

(b) **"TT"** shall mean Tetra Tech, Inc.

(c) **"Client Order"** shall mean the purchase order, request, authorization or other notification, and additions or modifications thereto whereby Client indicates its desire that TT furnish Services.

(d) **"TT Proposal"** shall mean these terms and conditions and the letter, proposal, quotation, or other notification, including any response to the Client Order, wherein TT offers to furnish Services.

(e) **"Services"** shall mean the Services of TT personnel described in the TT Proposal or Client Order and any other Services as may be added to, or performed in connection with, the Contract provided, however, that TT shall have no responsibility as a generator, operator, transporter, disposer or arranger of the transportation and/or disposal of Hazardous Substances as defined in Article 7 below.

(f) **"Contract"** shall mean these Terms and Conditions and the TT Proposal, and shall include, only to the extent not inconsistent with any aspect of the TT Proposal and these Terms and Conditions, the provisions of the Client Order. Upon execution by Client or commencement of Services at Client's request, TT's Proposal and these Terms and Conditions shall constitute a binding Contract and govern exclusively any Services provided.

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

2. COMPENSATION.

☒ **LUMP SUM**. Compensation for these Services shall be a Lump Sum of $ 19,500 .

☐ **TIME AND MATERIALS**. Funding for these Services will not exceed $__________ unless increased in accordance with this Contract and will be based on the following option (per the attached Scope of Services or List of Hourly Rates); plus Reimbursable Expenses times a factor of __________ and subcontractor/vendor Expenses times a factor of __________; TT's Direct Job Wages times a factor of __________.

☐ **COST PLUS FIXED FEE**. Compensation for these Services shall be TT's cost plus a fixed professional fee, including reimbursable expenses times a factor of __________; TT's Direct Job Wages times a factor of __________; plus subcontractor/vendor expenses times a factor of __________. The estimated compensation for Services is $__________; plus a fixed fee of $__________; for an estimated total of $__________.

Direct Job Wages or Hourly Rates for Time and Materials or Cost plus Fixed Fee contracts are subject to change to reflect adjustments in TT's salary levels.

In the event services beyond those specified in the Scope of Services and not included in the compensation above are required, TT shall submit a cost estimate for such services and a contract modification for cost and fee shall be negotiated and approved by the Client. TT may perform such additional efforts prior to the execution of such modification, but is not required to.

TT shall be compensated in accordance with TT's Proposal and the terms of this Article. TT's invoices are rendered monthly and are payable upon receipt. **Payment shall be made to the following address: Tetra Tech, Inc., PO 901642, Denver, CO 80291-1642.** Interest shall accrue at the rate of two percent (2%) over prevailing prime rate shall be charged on a monthly basis (or the maximum percentage allowed by law, whichever is less) on any amounts not paid within thirty (30) days of invoice submittal. In the event legal action is necessary to enforce the provisions of this Contract, TT shall be entitled to collect from the Client any judgment or settlement sums due, reasonable attorneys' fees, court costs and expenses incurred by TT in connection therewith and, in addition, the reasonable value of TT's time and expenses spent in connection with such action, computed at TT's prevailing fee schedule and expense policies. TT may, but is not required to, terminate its services if any invoice is unpaid for sixty (60) days. TT, its officers, employees, or consultants may be asked or required to appear as a witness or deponent, to furnish information or data through interrogatories, or otherwise be compelled to participate in, administrative or judicial proceedings arising in connection with Client's project. In that event and notwithstanding expiration or termination or this Contract, Client shall compensate TT in accordance with this Article and reimburse TT for reasonable legal expenses incurred in connection therewith, provided, however, that the provisions of Article 5, below, shall govern in the event TT is found to be at fault.

3. **CONFIDENTIALITY, ACCESS TO SITE, USE OF FACILITIES AND INFORMATION**. Client shall provide TT with access to facilities and information conducive to the efficient and accurate provision of Services, including such maps, drawings, records, and site access as are needed for the proper conduct of the Services, and shall indicate the reliability of all information provided. TT will maintain in confidence and return to Client any information designated by Client as confidential. If site visits are included in the Scope of Services, but not field construction or remediation, TT INC. shall visit the project and/or construction site at appropriate intervals to become generally familiar with the progress, quality of work (contractors' work) and if applicable to determine if the work is proceeding in general accordance with the Contract Documents. Visits to the project site and observations made by TT as part of Services during construction under Agreement shall not make TT responsible for, nor relieve the construction contractor(s) of the obligation to conduct comprehensive monitoring of the work sufficient to ensure conformance with the intent of the Contract Documents, and shall not make TT responsible for, nor relieve the construction contractor(s) of the full responsibility for all construction means, methods, techniques, sequences, and procedures necessary for coordinating and completing all portions of the work under the construction contract(s) and for all safety precautions incidental thereto.

4. INSURANCE.

(a) During the course of performance of the Services, TT will maintain the following insurance coverages:

TYPE OF COVERAGE	AMOUNT OF COVERAGE
Workers' Compensation/Employers Liability	Statutory/$1,000,000
Commercial General Liability/Excess Liability	$1,000,000/$2,000,000
Professional Liability/Contractors Pollution Liability	$1,000,000
Automobile Public Liability and Property Damage, including coverage for all hired or non-owned automotive equipment used in connection with the insured's operations.	$1,000,000

(b) If required, TT shall deliver to Client, Certificates evidencing that the above coverages are in effect and will not be canceled or materially changed without thirty (30) days written notice; (c) Additional Coverages: If desired, TT, will on a cost-reimbursable basis, endeavor to procure other desired insurance coverages if commercially available and applicable to the work being performed.

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

5. **INDEMNIFICATION**. TT shall indemnify and save harmless Client from claims, actions and judgments arising out of bodily injury, death or damage to property of third parties to the extent caused by the negligence of TT, provided, however, that "Hazardous Substance Claims" as defined in Article 7, below, shall be governed by that Article.

6. **WARRANTY OF SERVICES**. TT warrants that TT and its employees shall, in performing Services hereunder, exercise the degree of skill, care and diligence consistent with customarily accepted good practices and procedures at the time and location and for the type of Services performed. Should TT fail to perform to those standards, it shall (a) without cost to Client, reperform and correct any substandard Services; and (b) reimburse Client for Client's direct damages or otherwise correct faulty construction, to the extent resulting from such substandard Services. Services involving such activities as the prediction of ecological or health impacts, clean-up criteria, extent or degree of contamination or dispersion, air or water movement, geologic and hydrogeologic conditions, extent of appropriate investigation, scheduling, and cost estimating are highly sensitive to changes in regulatory and scientific criteria, methodologies and interpretations thereof and require the balance of diverse, often conflicting, Client business, economic, legal and other priorities. Client acknowledges these conditions and accepts the risk that, although TT may perform to the above standards, the Client's goals or desires may nevertheless not be realized. TT makes no other warranties, express or implied, with respect to its performance under this Contract. TT's liability hereunder, including any for damage to or loss of Client property, shall in no event extend beyond one year after completion of the Services in question or exceed the amount specified in Article 8 below.

7. **HAZARDOUS SUBSTANCE CLAIMS**. (a) In the event that TT's negligence is found, by final judicial determination, to have caused a Hazardous Substance Claim as defined below, TT shall reimburse Client for its costs and liabilities incurred under this Article 7, to the extent caused by TT, in an amount not to exceed that specified in Article 8 below; (b) "Hazardous Substance Claim" shall mean any and all claims, losses, costs, expenses, judgments, damages, and liabilities of any form or nature including but not limited to any for personal or emotional injury, death or damage to property arising out of or in connection with any actual, threatened or feared release, discharge or exposure to any toxic or hazardous waste, substance, material, or vapor, including without limitation, PCB's, petroleum, hydrocarbons, asbestos, mixed, radioactive or nuclear wastes and any other substance designated as hazardous or toxic under CERCLA, TSCA, RCRA or other statute or regulation ("Hazardous Substances"); (c) Except as provided in (a). above and to the fullest extent provided in Article 9 below (i) Client shall indemnify and hold harmless TT, its officers, directors, employees, agents, and representatives from and against any and all Hazardous Substance Claims; and (ii) Client shall defend any claim, action, or proceeding which may be brought against TT, its officers, directors, employees, agents, and representatives ("Defendants") arising out of or in connection with any Hazardous Substance Claim and shall bear all fees and expenses of attorneys and costs any Defendant incurs in the defense thereof.

8. **TT LIABILITY**. TT's total aggregate liability in connection with or arising out of the Contract or Services, including without limitation any under Articles 5, 6 and 7 above, shall in no event exceed the total amount of compensation paid to TT hereunder up to a total maximum amount of $250,000.

9. **CONSEQUENTIAL DAMAGES AND OTHER LIABILITIES**. TT and its employees shall in no event be liable for any special, indirect or consequential damages, including specifically but without limitation, any based on loss of profits or revenue, loss of or interference, whether or not by third parties, with full or partial use of any equipment, facility or property, including real property, cost of replacement power, energy or product, delay in or failure to perform or to obtain permits or approvals, cost of capital, loss of goodwill, claims of customers, fines or penalties assessed against client or similar damages. These terms provide allocations of risk and reward consistent with the nature and extent of the Services and to that end include (i) protections against, and limitations on, liability of TT and (ii) specific remedies of Client which shall be its sole and exclusive remedies. The allocations, including without limitation those set forth above and under Articles 6, 7, 8 and 13, shall survive this contract and apply to the fullest extent allowed by law irrespective of whether liability of TT is claimed, or found, to be based in contract, tort or otherwise (including negligence, warranty, indemnity and strict liability) and Client hereby waives all rights of recovery and assumes all risks beyond those explicitly allocated to TT herein.

10. **SITE CONTRACTORS**. For the benefit of Client and TT, Client agrees that it will cause provisions acceptable to TT governing insurance and indemnity to be inserted in each of Client's agreements for remediation or other construction or site services or work related to the Services.

11. **DELAYS**. Neither party shall be considered in default in the performance of its obligations hereunder to the extent that the performance of such obligations is prevented or delayed by any cause which is beyond the reasonable control of the affected party, and the time for performance of either party hereunder shall in such event be extended for a period equal to any time lost as a result thereof, and an equitable adjustment shall be made to TT's compensation.

12. **THIRD PARTY INTERESTS**. This Contract and the Services and Work Product produced hereunder are solely for the benefit of Client and are not intended to be for the benefit, or to be construed as creating rights in favor, of any third party. If Client is not the ultimate beneficiary of the Services or TT's work product is used in such a way as to create or induce any reliance by any third party, Client represents and warrants (i) that it shall bind its clients and/or such third parties to limitations on and protections against liability "protective provisions" commensurate with those afforded TT hereunder and that such protective provisions will, in fact, inure to the benefit of TT, and/or (ii) that Client has the power to act on behalf of its clients and/or such third parties and does hereby bind such parties to these protective provisions.

13. **CHANGES AND TERMINATION**. This Contract shall not be modified except by written agreement signed by both parties. Client shall have the right to make changes within the general scope of Services upon execution of a mutually accepted change order. Client shall also have the right to terminate this Contract prior to completion of the Services, after reasonable notice to TT in writing, in which event Client shall pay TT all amounts due TT hereunder up to the effective date of termination, plus TT's reasonable costs incurred after such date in terminating the Services. In the event that Client alleges breach on behalf of TT, Client shall afford TT in 30 days written notice to submit a reasonably acceptable plan to cure any alleged deficiency prior to termination. Recognizing that termination prior to completion may involve risks and exposures both as to cost of work and third party claims, Client shall in such event indemnify, protect and defend TT from claims arising out of any incomplete aspect of the Services. Both parties have the right to terminate this Contract for convenience with thirty (30) day notice to the other party.

14. **GOVERNING LAW, PRECEDENCE AND DIVISIBILITY**. Unless specified otherwise in Client orders, this Agreement shall be governed by the laws of the State of California excluding choice of law rules, which direct application of the laws of another jurisdiction. The provisions of the TT Proposal and these Terms and Conditions shall govern exclusively any Services furnished by TT and shall prevail over and render void any inconsistent or conflicting provision of the Client Order. If any term,

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

condition, provision or portion of this Contract is declared void or unenforceable, or limited in its application or effect, such event shall not affect any other provision or portion hereof. All other provisions and unaffected portions thereof shall remain fully enforceable and an adjustment in the compensation or other provisions shall be made with the purpose of equitably affecting the intent of the Contract to the maximum extent allowed by law.

15. ENTIRE AGREEMENT. This Contract contains the entire agreement between the parties as to the Services rendered hereunder. All previous or contemporaneous agreements, representations, warranties, promises, and conditions relating to the subject matter of this Contract are superseded by this Contract.

TETRA TECH, INC. – Accepted by:

Harpeth River Monitoring

CONTRACT OR PROJECT NAME

Tim Ward

BY TT (PRINT NAME)

Environmental Scientist

TITLE

[signature] / 08/12/2013

SIGNATURE /DATE

CLIENT – Accepted by:

HRWA

CLIENT

Dorie Bolze

BY (PRINT NAME)

Executive Director

TITLE

SIGNATURE /DATE

Gary Davis

From: Mike Thornton
Sent: Wednesday, September 11, 2013 4:42 PM
To: 'Michelle Barbero'; Gary Davis
Cc: Dorie Bolze; Blake Sage; Ann Rochelle; Ann Morbitt; Lonna Justus
Subject: RE: Additional questions regarding STPs files....

Michelle
I will be out of the office all day tomorrow but I will be in on Fri & Mon.
I probably have the info you are requesting from Gary.
Let me know what works for you.
If you need to come tomorrow, please call Lonna Justus (687-7068) to set up a time.

mike
687-7127

From: Michelle Barbero [mailto:MichelleBarbero@harpethriver.org]
Sent: Wednesday, September 11, 2013 4:37 PM
To: Gary Davis; Mike Thornton
Cc: Dorie Bolze; Blake Sage
Subject: Additional questions regarding STPs files....
Importance: High

Good afternoon Gary and Mike! I have a few requests from you both concerning the 3 Franklin Sewer STPs.

Mike – We would like to return to the TDEC Field Office again and look through the files for Berrys Chapel, Cartwrght Creek, and Franklin....hopefully tomorrow would be ok? We have our own copier/scanner that we can bring this time, which might be a little easier for making copies. Our 2 Program Assistants are available tomorrow afternoon from about noon until 4 or so.

Gary – You provided HRWA with the electronic DMR and MOR files for Franklin STP for end of 2010, 2011, 2012, 2013. Can we please have records of those files for 2009 and 2010 as well? If we need to, we can make copies from the field office files...we would just need to know.

Thank you all so much for all of this information about the STP's!

~Michelle Barbero
Watershed Science/Restoration Program Manager
Harpeth River Watershed Association

From: Gary Davis [mailto:Gary.Davis@tn.gov]
Sent: Monday, June 17, 2013 9:17 AM
To: Michelle Barbero
Cc: Mike Thornton
Subject: RE: TN0028827 RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Michelle

'lease call anytime (my normal work schedule 7 - 3:30) - I will probably have some meetings today - I plan to be in the ıffice tomorrow also and probably out of the office this Friday.

For Berry's Chapel and Cartwright Ck MORs review please call our Nashville Environmental Field Office (615-687-7000). I lon't think they are electronic. Mike Thornton (615-687-7127) in our Nashville Environmental Field Office may be able to ıssist you.

Thanks
Gary

Gary Davis, Permit Writer
Tennessee Department of Environment & Conservation
Division of Water Resources
401 Church Street, 6th Floor L&C Annex
Nashville, TN 37243
Office: 615-532-0649
Email: gary.davis@tn.gov

From: Michelle Barbero [MichelleBarbero@harpethriver.org]
Sent: Monday, June 17, 2013 8:23 AM
To: Elizabeth Rorie; Gary Davis
Subject: RE: TN0028827 RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Good morning Gary and Beth! Thank you for sending the Franklin MOR files....I have been slowly reviewing them and have a few questions for you Gary. Can I give you phone call sometime today? What time is best for you?

Also, I would love to also receive any MOR files for Cartwright Creek STP and Berrys Chapel STP please?

Thank you and I hope you all have a great weekend!

~Michelle

From: Elizabeth Rorie [mailto:Elizabeth.Rorie@tn.gov]
Sent: Tuesday, June 04, 2013 8:31 AM
To: Michelle Barbero
Cc: Wade Murphy; Gary Davis
Subject: TN0028827 RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Michelle,

The attachment is a zip file containing the MOR's you requested. If you have trouble opening them, let me know. If you have questions about the contents of the documents, please contact Gary.

Beth Rorie
Secretary
TDEC-DWR
401 Church St, 6th Floor Annex
Nashville, TN 37243
Office: 615-532-1172
Email: Elizabeth.Rorie@TN.gov

We accept and encourage electronic document submittals.
Error! Filename not specified.

From: Gary Davis
Sent: Tuesday, June 04, 2013 7:37 AM
To: Elizabeth Rorie
Subject: FW: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Beth
Please email the the zipped MORs to Michelle Barbero, per her 5-31-2013 request.
Thanks
Gary

Gary Davis, Permit Writer
Tennessee Department of Environment & Conservation
Division of Water Resources
401 Church Street, 6th Floor L&C Annex
Nashville, TN 37243
Office: 615-532-0649
Email: gary.davis@tn.gov

From: Michelle Barbero [MichelleBarbero@harpethriver.org]
Sent: Friday, May 31, 2013 4:01 PM
To: Gary Davis
Subject: RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Good afternoon Gary. I would love to receive electronic copies of the MORs for Franklin!

When I worked for Metro Water Services in the Watershed Group under NPDES, I received real-time overflow reports which we were able to create a GIS layer and keep track of chronic overflow points. I would love to have some type of similar information for Franklin (and anywhere else in the Harpeth for that matter) that might help me know where to concentrate our efforts. Not only for policy/regulatory information, but also for restoration efforts. I manage the HRWA Restoration Program and would love to use grant money wisely and efficiently.

Thank you for any info you can share!

~MICHELLE BARBERO
WATERSHED SCIENCE PROGRAM MANAGER
HARPETH RIVER WATERSHED ASSOCIATION

From: Dorie Bolze
Sent: Thursday, May 30, 2013 2:38 PM
To: Gary Davis
Cc: Michelle Barbero; Alexandra Ewing; Wade Murphy
Subject: RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Gary,

Thanks so much! Our email system is going through a transition, so things are a bit awkward for HRWA today.

am sure Michelle Barbero would like the electronic versions of the MORs. I will let you two communicate ınd go on vacation!

Dorie

From: Gary Davis
Sent: Thursday, May 30, 2013 1:31 PM
To: Dorie Bolze
Cc: Michelle Barbero; Alexandra Ewing; Wade Murphy
Subject: RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Dorie
Attached is the agreement info I mentioned in today's email (Re: No. 3 - low-pressure sewer system).
Thanks
Gary

Gary Davis, Permit Writer
Tennessee Department of Environment & Conservation
Division of Water Resources
401 Church Street, 6th Floor L&C Annex
Nashville, TN 37243
Office: 615-532-0649
Email: gary.davis@tn.gov

From: Gary Davis
Sent: Thursday, May 30, 2013 9:25 AM
To: Dorie Bolze
Cc: Michelle Barbero; Sandy Ewing; Wade Murphy
Subject: RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Dorie
We appreciate your email and I will provide some brief answers now.

Re: No. 1 - We have the DMR hard copies here & developed the draft permit DMR summaries based on the online EPA ICIS results (I think that some ICIS results updating has occurred for Berry's Chapel & Cartwright Ck). We have electronic MOR monthly results for Franklin (current permit's term) and can email to you if needed.

Re: No. 2 - Berry's Chapel's current permit included bonding ..., because they wanted to not be under TRA. The permittee appealled the current permit's financial requirements. Since the permittee is now under TRA the financial requirements are not applicable for the new permit. I have attached permittee's appeal document for the current permit.

Re: No. 3 - I am expecting a draft permit written comment from the permittee regarding the litigation/settlement and it will take time to sort out. I will try to email you info soon from the County/... regarding the low-pressure sewer system.

Hope you have a good vacation and talk with you soon.
Thanks
Gary

Gary Davis, Permit Writer
Tennessee Department of Environment & Conservation
Division of Water Resources
401 Church Street, 6th Floor L&C Annex
Nashville, TN 37243

Office: 615-532-0649
Email: gary.davis@tn.gov

From: Dorie Bolze [doriebolze@harpethriver.org]
Sent: Wednesday, May 29, 2013 8:09 PM
To: Gary Davis
Cc: Michelle Barbero; Sandy Ewing
Subject: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Hi Gary,

How are you? We have been spending time going through your hard work on all of the 3 Harpeth draft permits. Each has its own special issues and it takes time to get on top of it all.

I had a few questions and thought I would email them in case some could be emailed back. Just let us know if some of this is best to simply come down to your offices or the field office to find in the files.

1. For all 3: Michelle Barbero may have already emailed you about this, but we would like the monthly reports that are used to compile the summary DMR charts in each permit. She didn't find them on line when she was looking the other day. Feel free to point us in the right direction.

Berry's Chapel:

2. Did BC send in financial reports as required under the last permit? If so we would be interested in receiving them. The section 3.8 that established financial requirements like an O & M account, reserve fund, and bonding has been removed. I would be interested in the reasons for that when convenient.

3. 125,000 gallon reserve in the capacity: the paragraph 2 of the Rationale states that this is lifted with regard to the county sewer project (that it is not needed anymore), but that it is still in place from prior litigation/settlement. I would like to understand this better. I was wondering about what information was provided regarding the lack of need to maintain the 125,000 gallon reserve for hooking up nearby septic neighborhoods (the Grassland Sewer project headed up by the county). Did the county provide that to you/TDEC?

I will be out of town next week on vacation, but feel free to send simple things via email and we can talk about anything more complex when I get back.

Thanks!

Dorie

Dorie

Dorie Bolze
Executive Director
Harpeth River Watershed Association
P.O. Box 1127
Franklin, TN 37065
615-479-0181 (mobile)
615-790-9767
www.harpethriver.org
Street address:

215 Jamestown Park
Brentwood, TN 37027

rotecting and Restoring the State Scenic Harpeth River and Clean Water in TN since 1999.

Gary Davis

From: Michelle Barbero <MichelleBarbero@harpethriver.org>
Sent: Wednesday, September 11, 2013 4:37 PM
To: Gary Davis; Mike Thornton
Cc: Dorie Bolze; Blake Sage
Subject: Additional questions regarding STPs files....

Importance: High

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Thank you all so much for all of this information about the STP's!

~Michelle Barbero
Watershed Science/Restoration Program Manager
Harpeth River Watershed Association

From: Gary Davis [mailto:Gary.Davis@tn.gov]
Sent: Monday, June 17, 2013 9:17 AM
To: Michelle Barbero
Cc: Mike Thornton
Subject: RE: TN0028827 RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Michelle
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ro: Elizabeth Rorie; Gary Davis
;ubject: RE: TN0028827 RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

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~Michelle

From: Elizabeth Rorie [mailto:Elizabeth.Rorie@tn.gov]
Sent: Tuesday, June 04, 2013 8:31 AM
To: Michelle Barbero
Cc: Wade Murphy; Gary Davis
Subject: TN0028827 RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

Michelle,

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Beth Rorie
Secretary
TDEC-DWR
401 Church St, 6th Floor Annex
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Office: 615-532-1172
Email: Elizabeth.Rorie@TN.gov

We accept and encourage electronic document submittals.
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From: Gary Davis
Sent: Tuesday, June 04, 2013 7:37 AM
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Subject: FW: A few questions about the Berry's Chapel and Cartwright Creek draft permits

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Thanks
Gary

Gary Davis, Permit Writer
Tennessee Department of Environment & Conservation
Division of Water Resources
401 Church Street, 6th Floor L&C Annex
Nashville, TN 37243

Office: 615-532-0649
Email: gary.davis@tn.gov

From: Michelle Barbero [MichelleBarbero@harpethriver.org]
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Subject: RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

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Gary Davis

From: Mike Thornton
Sent: Wednesday, September 11, 2013 4:42 PM
To: 'Michelle Barbero'; Gary Davis
Cc: Dorie Bolze; Blake Sage; Ann Rochelle; Ann Morbitt; Lonna Justus
Subject: RE: Additional questions regarding STPs files....

Michelle
I will be out of the office all day tomorrow but I will be in on Fri & Mon.
I probably have the info you are requesting from Gary.
Let me know what works for you.
If you need to come tomorrow, please call Lonna Justus (687-7068) to set up a time.

mike
687-7127

From: Michelle Barbero [mailto:MichelleBarbero@harpethriver.org]
Sent: Wednesday, September 11, 2013 4:37 PM
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Cc: Dorie Bolze; Blake Sage
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Importance: High

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Thank you all so much for all of this information about the STP's!

~Michelle Barbero
Watershed Science/Restoration Program Manager
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From: Gary Davis [mailto:Gary.Davis@tn.gov]
Sent: Monday, June 17, 2013 9:17 AM
To: Michelle Barbero
Cc: Mike Thornton
Subject: RE: TN0028827 RE: A few questions about the Berry's Chapel and Cartwright Creek draft permits

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Also, I would love to also receive any MOR files for Cartwright Creek STP and Berrys Chapel STP please?

Thank you and I hope you all have a great weekend!

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Cc: Wade Murphy; Gary Davis
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The attachment is a zip file containing the MOR's you requested. If you have trouble opening them, let me know. If you have questions about the contents of the documents, please contact Gary.

Beth Rorie
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nt: Monday, February 04, 2013 12:31 PM
: Vojin Janjic
: Nuhfer.Mark@epamail.epa.gov
bject: Franklin STP

od afternoon, Vojin

management was interested in knowing when the draft of Franklin STP might be done.
ıw from your Dataviewer it has expired

ınks for letting us know.
ınie Kagey

ıave material coming your way on the sewer permits, monitoring, and such- morrow

rie Bolze [doriebolze@harpethriver.org]
ıt: Tuesday, February 05, 2013 11:26 AM
Gary Davis

Gary,

have revised and pared down some of the work we have been compiling for you and everyone at TDEC about approaches water quality monitoring on the Harpeth related to the sewer permits (and others involved as well), a technical advisory ımittee and such.

ill send it tonight or tomorrow. I am juggling a sick teenager with lots of projects due as well.

ıow I mentioned it to you over the phone, but we are really excited that USGS is interested in considering the Harpeth as ir project site as part of their national project to work on monitoring nutrients. So there is about $80,000 from USGS that go into 6 monitoring gages on the Harpeth on top of their current commitment of the flow gages. We have that in this terial too.

ill try to get it out as widely as possible, but you are welcome to email freely anything I send to you obviously. We may not 'e everyone's email that will be interested.

'ie

Dorie Bolze

'orene Bolze
xecutive Director
larpeth River Watershed Association
ike Us On acebook
Mobile: 615-479-0181
Office: 615-790-9767 Ext. 321
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Purchase this beautiful specialty license plate
help protect rivers and clean water in TN.

'orking Together to Protect the State Scenic Harpeth River and Clean Water in Tennessee

E: Franklin STP TN0028827 Harpeth River 2012 Bioassessment Report

ebbie Arnwine

nt: Monday, January 28, 2013 10:25 AM

Gary Davis; Jimmy R. Smith

Wade Murphy

achments: Instream BioSurvey Harpet~1.xlsx (27 KB)

y guys,

ent back through all the taxa sheets and calculated scores and metrics using the 2011 biocriteria so you can now talk apples apples over the years. I also corrected metric errors (often affects TR and EPT since they sometimes count species and /or dentified taxa as separate.) The corrected metrics are in red on the table. I updated the graphs with the corrections. Let know if you have any questions.

bbie Arnwine
vironmental Specialist 5
nning and Standards Section, DWR, TDEC
ı Floor L&C Annex, 401 Church Street
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5-532-0703

---

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nt: Tuesday, January 15, 2013 11:31 AM
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: Wade Murphy
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: attached their 2012 Bioassessment Report (as a pdf) & they should soon mail you directly a hard copy. Also, attached is a ono bioassessment results spreadsheet (please update the spreadsheet w/2012 results & email to me).

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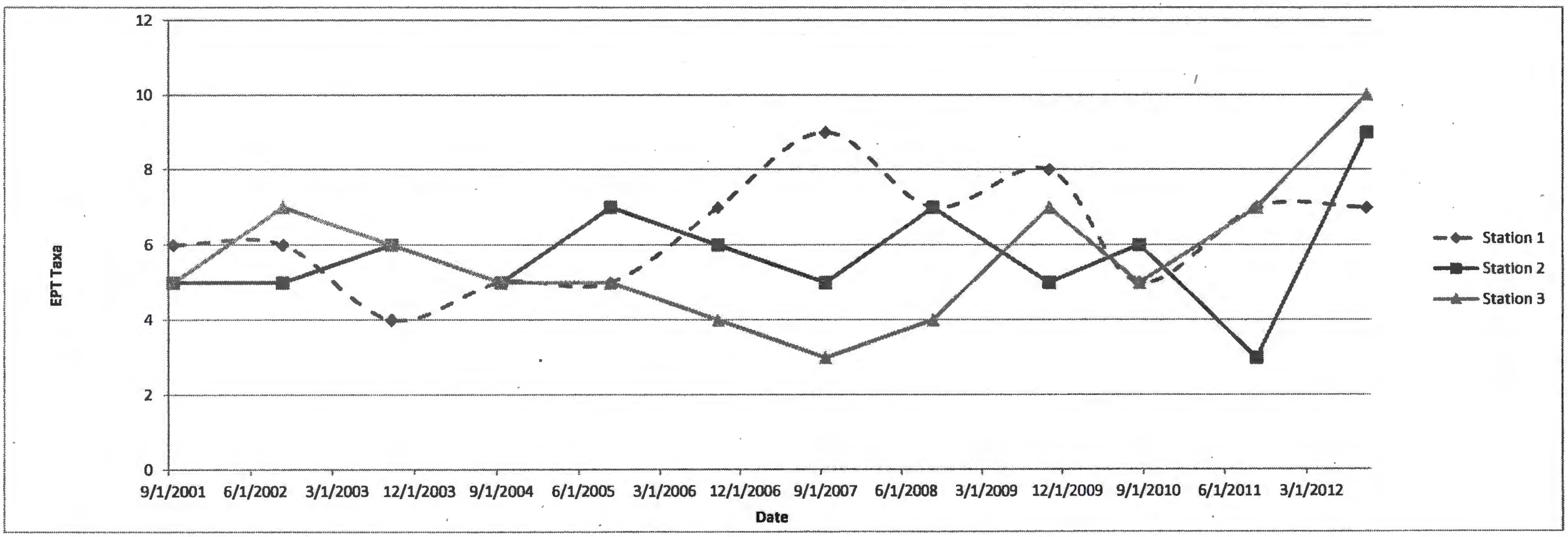
ınks

y

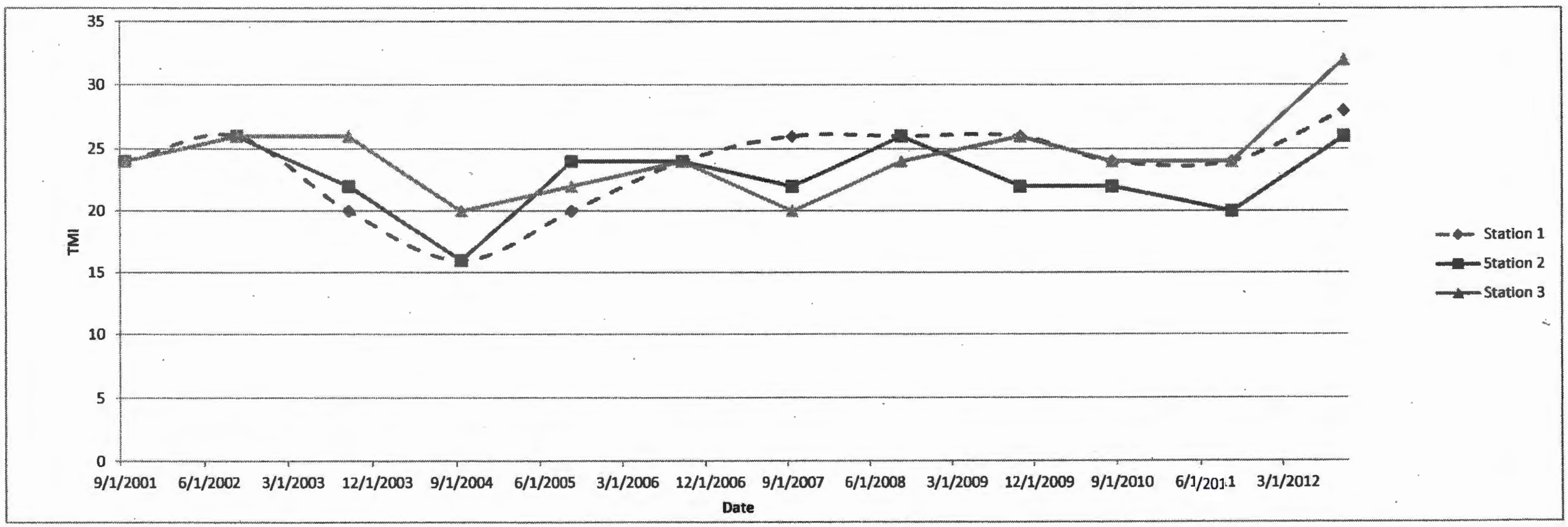
y Davis
EC - Division of Water Resources
i-532-0649

Permittee's Instream BioSurveys Results

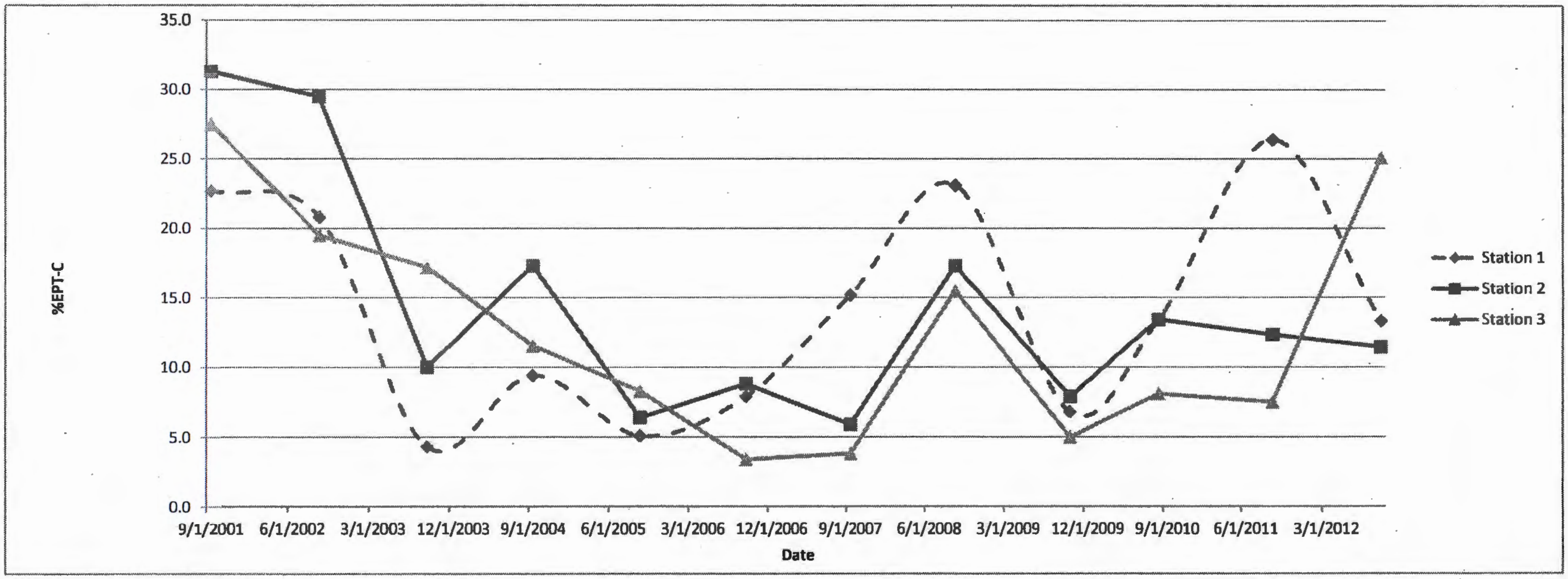
Sta		9/11/2001	9/10/2002	9/2/2003	9/1/2004	9/7/2005	9/6/2006	9/21/2007	9/3/2008	10/1/2009	8/23/2010	9/23/2011	9/13/2012
1	RM 85.4 Upstream of Outfall 001 Treated Effluent discharges at RM 85.2												
	Total Taxa	24	24	20	18	18	23	23	23	30	22	32	29
	EPT Taxa	6	6	4	5	5	7	9	7	8	5	7	7
	% OC	45.4	24.8	87.1	59.9	14.0	24.3	7.1	37.1	21.8	15.4	64.5	21.4
	%EPT-C	22.7	20.8	4.3	9.4	5.1	7.9	15.2	23.1	6.8	13.4	26.4	13.3
	NCBI	5.53	5.36	5.99	5.60	5.23	5.42	5.00	5.32	5.20	5.22	5.53	5.30
	% TNut-Tol	49.2	59.9	26.8	64.8	92.6	77.2	76.6	40.9	78.2	53.6	37.6	69.9
	% Cling	52.5	63.4	45.9	44.9	82.3	71.8	85.3	54.4	72.8	57.4	25.9	66.3
	TMI	24	26	20	16	20	24	26	26	26	24	24	28
2	Just Downstream of Outfall 001 Treated Effluent Discharge at RM 85.2												
	Total Taxa	20	22	19	18	21	21	17	21	22	24	36	28
	EPT Taxa	5	5	6	5	7	6	5	7	5	6	3	9
	% OC	30.8	26.8	68.8	64.7	12.3	13.0	4.5	16.8	49.6	34.7	50.9	43.2
	%EPT-C	31.3	29.5	10.0	17.3	6.4	8.8	5.9	17.3	7.9	13.4	12.3	11.4
	NCBI	5.34	5.52	5.87	5.51	5.22	5.13	4.82	4.33	5.40	5.35	6.43	5.35
	% TNut-Tol	51.5	51.1	31.3	62.6	85.6	68.6	88.2	61.4	43.8	52.5	36.8	43.7
	% Cling	50.0	51.6	72.9	32.8	86.2	71.1	80.5	35.0	40.4	50.0	12.9	37.6
	TMI	24	26	22	16	24	24	22	26	22	22	20	26
3	Further Downstream at RM 85.1 (Outfall 001 Treated Effluent at RM 85.2)												
	Total Taxa	25	24	21	20	19	22	20	19	31	22	27	33
	EPT Taxa *	5	7	6	5	5	4	3	4	7	5	7	10
	% OC	24.5	23.0	65.2	49.0	11.1	8.9	14.1	22.8	32.1	25.4	61.8	25.1
	%EPT-C	27.5	19.5	17.2	11.5	8.3	3.4	3.8	15.5	5.0	8.1	7.5	25.1
	NCBI	5.67	5.55	5.75	5.31	5.27	4.96	4.92	4.98	5.04	5.49	5.08	5.19
	% TNut-Tol	57.5	53.3	29.2	66.4	80.1	72.8	79.3	61.7	46.2	47.6	28.1	48.1
	% Cling	42.5	48.0	60.5	44.1	73.5	65.1	67.1	56.5	60.8	52.4	29.6	51.1
	TMI	24	26	26	20	22	24	20	24	26	24	24	32



EPT Taxa
12
10
8
6
4
2
0
9/1/2001
6/1/2002
3/1/2003
12/1/2003
9/1/2004
6/1/2005
3/1/2006
12/1/2006
9/1/2007
6/1/2008
3/1/2009
12/1/2009
9/1/2010
6/1/2011
3/1/2012
Date
Station 1
Station 2
Station 3



35
30
25
20
15
10
5
0
TMI
9/1/2001
6/1/2002
3/1/2003
12/1/2003
9/1/2004
6/1/2005
3/1/2006
12/1/2006
9/1/2007
6/1/2008
3/1/2009
12/1/2009
9/1/2010
6/1/2011
3/1/2012
Date
Station 1
Station 2
Station 3



35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
%EPT-C
9/1/2001
6/1/2002
3/1/2003
12/1/2003
9/1/2004
6/1/2005
3/1/2006
12/1/2006
9/1/2007
6/1/2008
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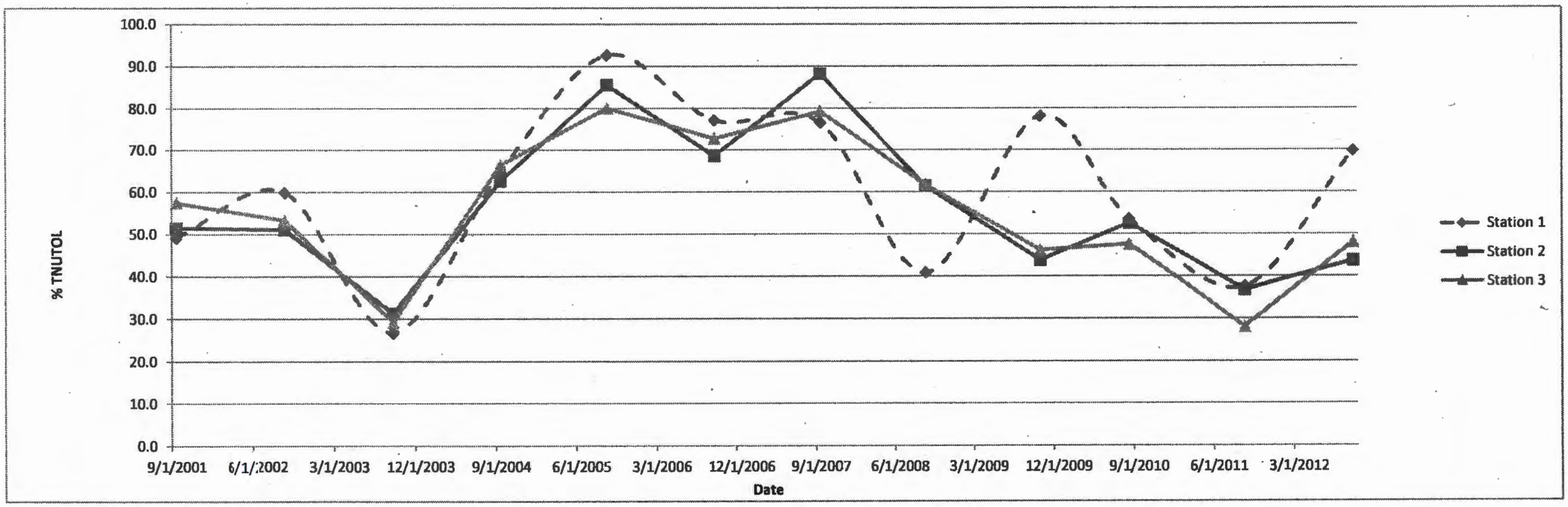
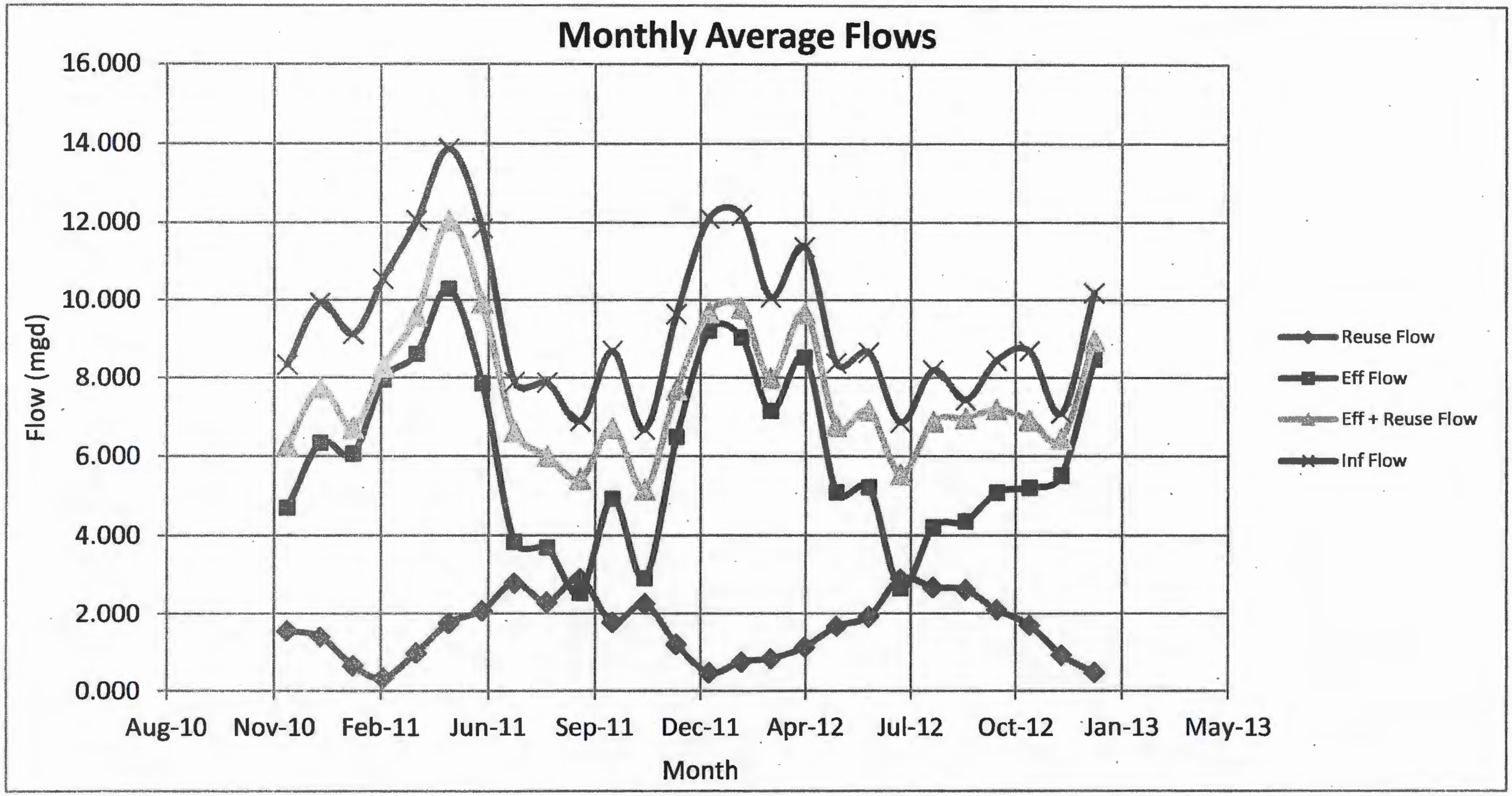
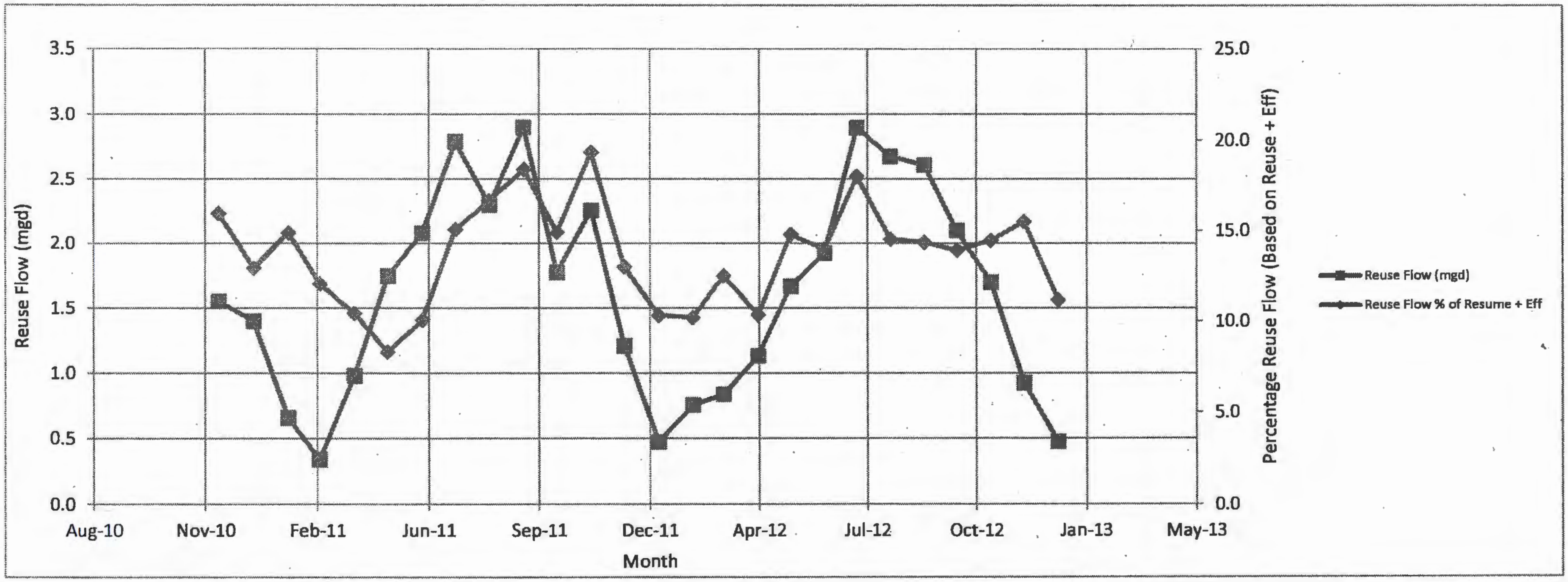
12/1/2009
9/1/2010
6/1/2011
3/1/2012
Date
Station 1
Station 2
Station 3



100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
% TNUTOL
9/1/2001
6/1/2002
3/1/2003
12/1/2003
9/1/2004
6/1/2005
3/1/2006
12/1/2006
9/1/2007
6/1/2008
3/1/2009
12/1/2009
9/1/2010
6/1/2011
3/1/2012
Date
Station 1
Station 2
Station 3


Monthly Average Flows
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
Flow (mgd)
Aug-10
Nov-10
Feb-11
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Month
Reuse Flow
Eff Flow
Eff + Reuse Flow
Inf Flow



3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Reuse Flow (mgd)
25.0
20.0
15.0
10.0
5.0
0.0
Percentage Reuse Flow (Based on Reuse + Eff)
Aug-10
Nov-10
Feb-11
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Month
Reuse Flow (mgd)
Reuse Flow % of Resume + Eff

arpeth River 2012 Bioassessment Report

ary Davis

nt: Wednesday, January 16, 2013 8:43 AM

: Dorie Bolze [doriebolze@harpethriver.org]

tachments: Harpeth River 2012 Bioasse~1.pdf (2 MB)

›rie

r your request I've attached Franklin's (per TN0028827) Harpeth River 2012 Bioassessment Report. We have just ceived/will evaluate and incorporate results into the chrono summary which will be included in their upcoming draft report tionale.

ease call/email me with any questions or comments.

anks

ıry

ıry Davis
›EC - Division of Water Resources
5-532-0649

) % saturation calculator

ımy R. Smith

ıt: Thursday, December 20, 2012 10:58 AM

Gary Davis

achments: DO sat calc.xls (28 KB)

ry,

ꜱ attached for the DO sat calculator I have been using. You enter the BP, Temp, and measured dissolved oxygen ıcentration, and it will calculate the % saturation. The field that has the long equation that does the conversion is in cell E4 ou want to check it out. I do not recall where I found this originally.

ase let me know if you have any questions about this, and I hope it is of some use.

ınks - Jimmy

C E

3 Barometric Pressure (atm) = 0.98

100% O2 sat (ppm) = 8.411

5 Water Temp [C] = 22.98

9 Measured DO (ppm) = 6.75

11 % saturation = 80.3

```
=(($C$3*EXP(7.7117-1.31403*LN(C5+45.93)))*(1-EXP(11.8571-(3840.7/(C5+273.15))-
(216961/((C5+273.15)^2)))/$C$3)*(1-(0.000975-
(0.00001426*C5)+(0.00000006436*(C5^2)))*$C$3))/(1-EXP(11.8571-(3840.7/(C5+273.15))-
(216961/((C5+273.15)^2)))/$C$3)/(1-(0.000975-(0.00001426*C5)+(0.00000006436*(C5^2))))
```

From: Saya Qualls
To: Davis, Gary; Janjic, Vojin; Murphy, Wade
Date: 10/28/2008 8:44 AM
Subject: grassland sewer

It will be interesting to see how this comes out. If Franklin does opt to take this, we'll need to get a schedule on it. I'd be afraid to release that reserve at Lynwood until we know that this is a done deal.

saq

http://www.tennessean.com/apps/pbcs.dll/article?AID=/20081028/COUNTY090101/810280313/1164/COUNTY09

From: "Bo Butler" <bbutler@ssr-inc.com>
To: <gary.davis@tn.gov>
CC: "Mark Hilty" <mark.hilty@franklintn.gov>, "David Parker" <Davidp@frankli...
Date: 12/28/2009 12:46 PM
Subject: Franklin NPDES
Attachments: Metals Info.xlsx

Gary:

I went through the testing done since April 2005 for Silver, Copper and Selenium from lab results the City has on file. Testing was performed by Environmental Science Corporation.

I have attached the spreadsheet showing the data collected. When looking at this larger set of data, the results for the three parameters in question are show below. There was only one instance during this 54-month period of a value for copper above the detectable limit. The dates ore from 4/2005 through 9/2009.

Silver

Copper

Selenium

Max

0.03200

0.02600

0.06000

Ave

0.00099

0.01030

0.01409

* Average Values Use 1/2 BDL for those values below BDL

Please let me know if you need additional information.

Thanks,

Bo Butler, P.E.
Smith Seckman Reid, Inc.
Direct: 615/460-0515
Fax: 615/386-8469
http://www.ssr-inc.com/ <http://www.ssr-inc.com/>

P Please do not print this e-mail unless necessary

From: Gary Davis [mailto:Gary.Davis@tn.gov]
Sent: Monday, December 21, 2009 2:26 PM
To: Bo Butler
Cc: Mark Hilty
Subject: Re: Franklin NPDES

Bo

Good idea to provide supplementary data - as available.

Thanks

Gary

>>> "Bo Butler" <bbutler@ssr-inc.com> 12/21/2009 1:34 PM >>>

Gary:

I have located the data used in the Franklin NPDES application from 6/1/06. We are confirming the values used in that application, and I am looking at the values collected since that time to see if we can provide information that better describes the effluent characteristics for Copper, silver and selenium. I hope to have that for you tomorrow or Wednesday.

Thanks,

Bo Butler, P.E.
Smith Seckman Reid, Inc.
Direct: 615/460-0515
Fax: 615/386-8469
http://www.ssr-inc.com/ <http://www.ssr-inc.com/>

P Please do not print this e-mail unless necessary

ATTACHMENT 1

	Silver	Copper	Selenium	
Detection Limit	**0.00050**	**0.02000**	**0.02000**	mg/L
Date of Test				
4/6/2005	**0.00050**	0.01000	0.01000	
5/3/2005	**0.03200**	0.01000	0.01000	
6/7/2005	**0.00070**	0.01000	0.01000	
7/5/2005	**0.00058**	0.01000	**0.06000**	
8/2/2005	**0.00510**	0.01000	0.01000	
9/13/2005	**0.00060**	0.01000	0.01000	
10/4/2005	0.00025	0.01000	0.01000	
11/8/2005	0.00025	0.01000	0.01000	
12/6/2005	0.00025	0.01000	0.01000	
1/3/2006	0.00025	0.01000	0.01000	
2/8/2006	0.00025	0.01000	0.01000	
3/7/2006	0.00025	0.01000	0.01000	
4/4/2006	0.00025	0.01000	0.01000	
5/2/2006	0.00025	0.01000	0.01000	
6/6/2006	0.00025	0.01000	0.01000	
7/5/2006	0.00025	0.01000	0.01000	
8/8/2006	0.00025	0.01000	0.01000	
9/5/2006	0.00025	0.01000	0.01000	
10/3/2006	0.00025	0.01000	0.01000	
11/7/2006	0.00025	0.01000	0.01000	
12/5/2006	0.00025	0.01000	0.01000	
1/2/2007	0.00025	0.01000	0.01000	
2/6/2007	0.00025	0.01000	0.01000	
3/6/2007	**0.00068**	0.01000	0.01000	
4/3/2007	**0.00062**	0.01000	0.01000	
5/8/2007	**0.00050**	0.01000	0.01000	
6/5/2007	0.00025	**0.02600**	0.01000	
7/3/2007	0.00025	0.01000	0.01000	
8/7/2007	0.00025	0.01000	0.01000	
9/4/2007	0.00025	0.01000	0.01000	
10/2/2007	0.00025	0.01000	0.01000	
11/6/2007	0.00025	0.01000	0.01000	
12/4/2007	0.00025	0.01000	**0.03300**	
1/2/2008	**0.00140**	0.01000	0.01000	
2/5/2008	0.00025	0.01000	0.01000	
3/4/2008	0.00025	0.01000	0.01000	
4/8/2008	0.00025	0.01000	0.01000	
5/6/2008	0.00025	0.01000	0.01000	
6/3/2008	0.00025	0.01000	0.01000	
7/8/2008	0.00025	0.01000	0.01000	
8/5/2008	0.00025	0.01000	0.01000	
9/3/2008	0.00025	0.01000	0.01000	
10/7/2008	0.00025	0.01000	**0.05300**	
11/4/2008	0.00025	0.01000	0.01000	
12/2/2008	0.00025	0.01000	**0.05200**	
1/6/2009	0.00025	0.01000	**0.05200**	
2/3/2009	0.00025	0.01000	**0.02000**	
3/3/2009	0.00025	0.01000	**0.02100**	
4/7/2009	0.00025	0.01000	0.01000	
5/5/2009	0.00025	0.01000	0.01000	
6/9/2009	0.00025	0.01000	0.01000	
7/7/2009	0.00025	0.01000	0.01000	
8/4/2009	0.00025	0.01000	0.01000	
9/8/2009	0.00025	0.01000	0.01000	

mg/L

	Silver	Copper	Selenium	
Max	0.0320	0.026	0.060	mg/L
Ave	0.0010	0.010	0.014	mg/L

* Average Values Use 1/2 BDL for those values below BDL

# of test results	54	54	54	
# of values above Detectable Limit	10	1	7	
Maximum Value	0.03200	0.02600	0.06000	mg/L
Average Value	0.00099	0.01030	0.01409	mg/L

* Average Values Use 1/2 BDL for those values below BDL

owing Up - Franklin
Lockhart
Wednesday, April 11, 2012 4:20 PM
Walters, Kevin [kwalters@tennessean.com]
hments: CDM Revised Franklin IWRP ~1.pdf (311 KB)

, thanks for your patience. Our chief engineer discussed this with Franklin's consultants several years ago. Attached is a
e of work" document from 2009. It is my understanding this plan was in the preliminary stages at that time. We have not
l anything additional since that initial discussion.

told the Harpeth River cannot accept any additional pollutants without the city obtaining offsets from other
es. Additionally, their master water plan will need to include several items that will require significant public input and
'ement. While the attached document is quite lengthy, you will find information that explains the city's need for a
rehensive water plan, including some of the items that would need to be considered.

e this helps Kevin! Let me know if you need anything additional.

: Walters, Kevin [mailto:kwalters@tennessean.com]
Wednesday, April 11, 2012 12:54 PM
eg Lockhart
:ct: Franklin water, sewer question

Aeg.

'o questions that I'm looking to get an answer for today about Franklin water and sewer.

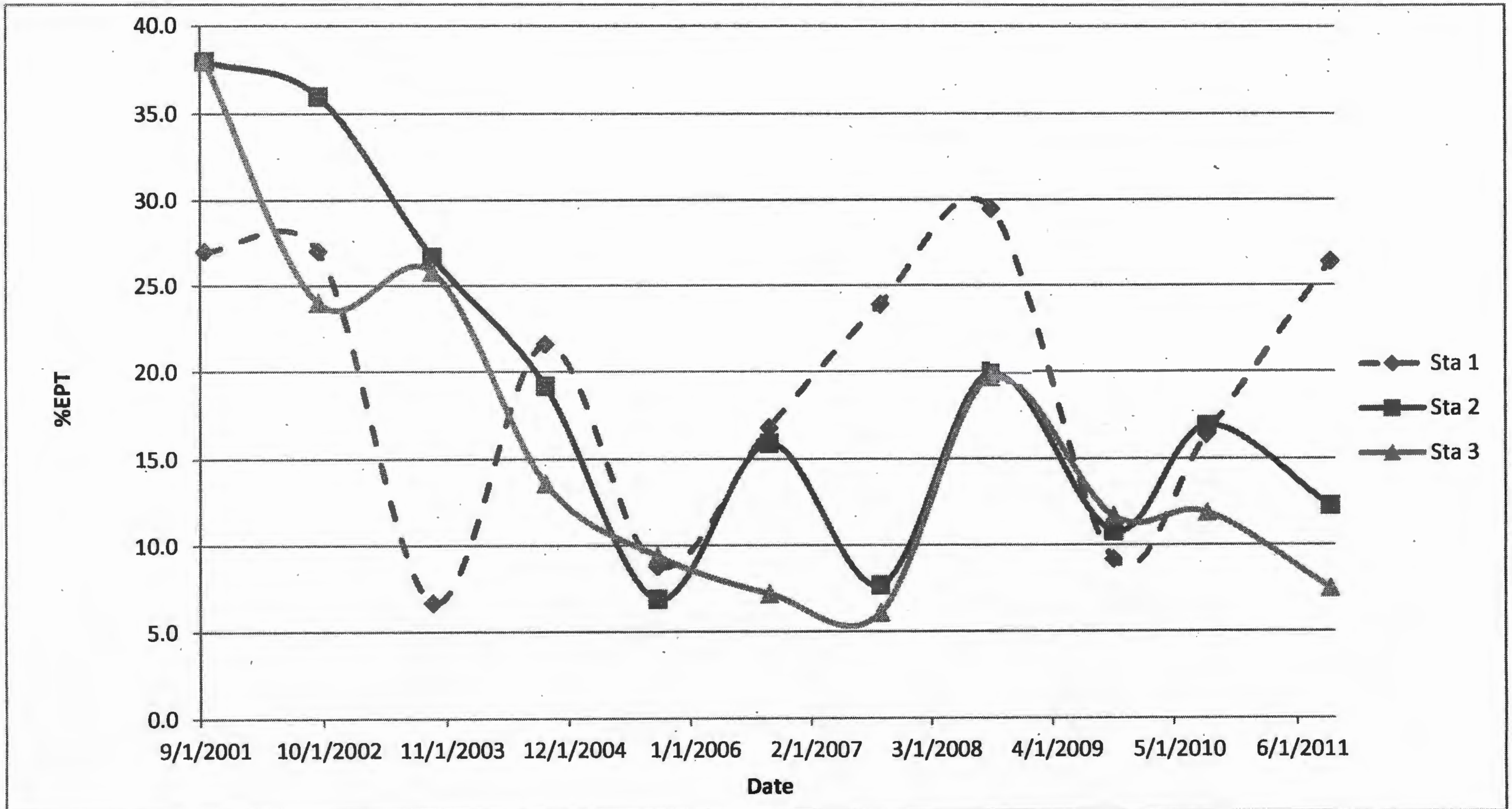
ıklin's consultants have recommended that the city add a new sewer plant on the Harpeth River sometime in the next 30 years
ould be upstream from the drinking water plant. Given the condition of the river being on the state impaired list what would the
ve to do to get regulatory approval to add more effluent to the river?

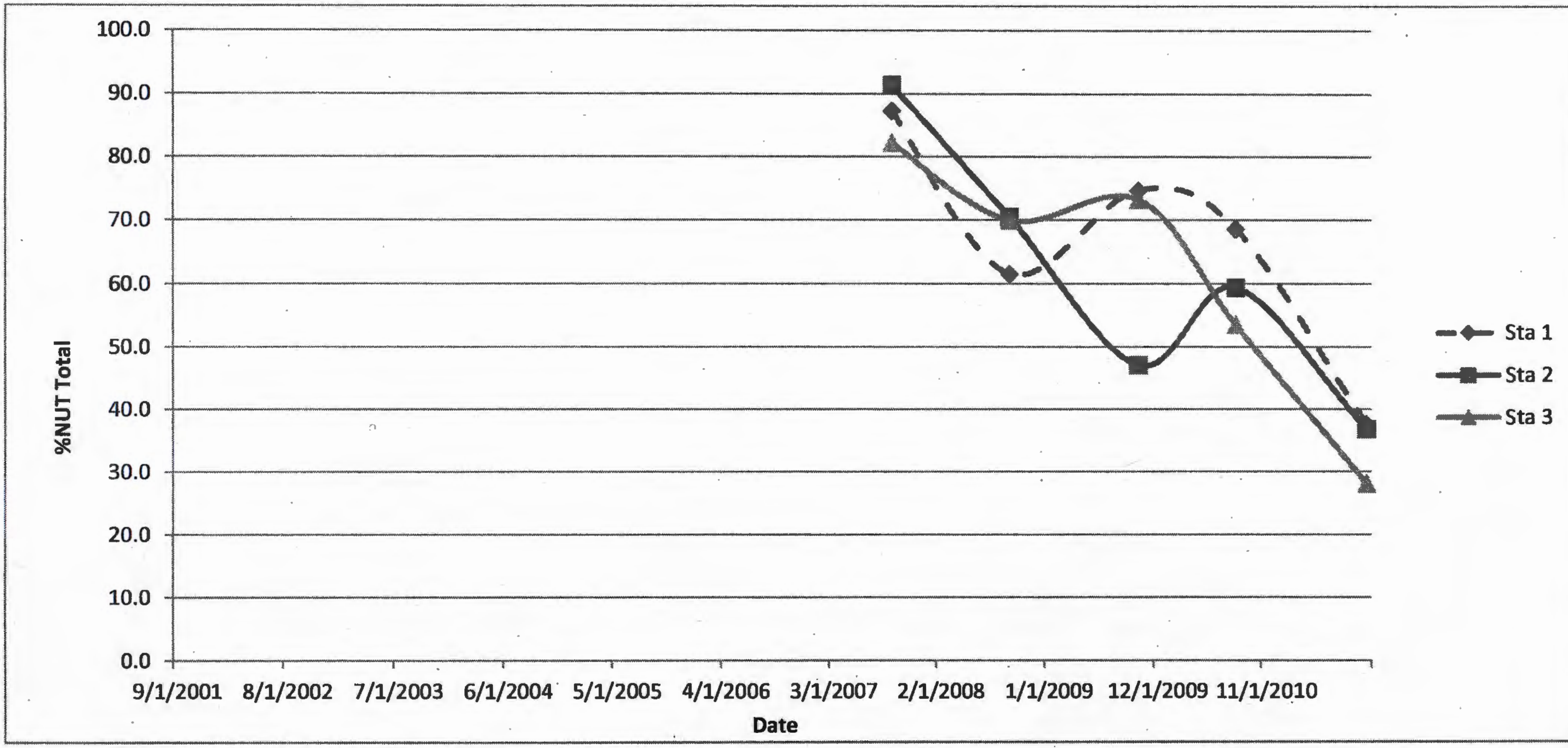
TDEC seen the consultants' plan do they plan to weigh in?

Walters
n city government reporter
ennessean
5) 771-5471
: @Frkwriter

Permittee's Instream BioSurveys Results

Sta		9/11/2001	9/10/2002	9/2/2003	9/1/2004	9/7/2005	9/6/2006	9/21/2007	9/3/2008	10/1/2009	8/23/2010	9/23/2011
1	RM 85.4 (Upstream of Outfall 001 @ RM 85.2)											
	Total Taxa	27	25	20	22	18	24	23	27	33	24	32
	EPT Taxa	6	6	4	6	5	7	9	8	9	6	7
	% OC	45.0	25.0	87.1	60.3	14.0	22.2	7.1	37.1	21.8	15.4	64.5
	% EPT	27.0	27.0	6.7	21.6	8.8	16.8	23.9	29.5	9.2	16.4	26.4
	NCBI	5.65	5.63	6.80	5.57	5.23	5.37	5.00	5.24	5.20	5.22	5.53
	% Dominant	22.0	39.0	64.5	31.4	74.0	52.2					
	% Nut-Tol							87.3	61.6	74.8	68.7	37.6
	% Cling	69.0	64.0	45.9	43.9	82.8	68.0	79.2	15.2	73.3	57.4	25.9
	TMI	28	28	14	24	22	26	26	20	28	24	24
2	RM 85.2 (Downstream of Outfall 001 @ RM 85.2)											
	Total Taxa	20	22	19	23	23	24	18	22	23	25	36
	EPT Taxa	5	5	6	8	8	6	6	7	5	6	3
	% OC	31.0	27.0	68.8	64.7	12.3	13.4	4.5	16.8	49.6	33.8	50.9
	% EPT	38.0	36.0	26.7	19.2	6.9	15.9	7.7	20.0	10.8	16.9	12.3
	NCBI	5.50	5.70	6.02	5.51	5.19	5.08	4.82	4.33	5.40	5.35	6.43
	% Dominant	25.0	26.0	51.3	26.4	76.9	49.4					
	% Nut-Tol							91.4	70.5	47.1	59.4	36.8
	% Cling	68.0	52.0	72.9	32.2	79.3	67.4	77.8	9.1	40.4	48.8	12.9
	TMI	30	30	22	24	26	26	20	24	22	20	20
3	RM 85.1 (Downstream of Outfall 001 @ RM 85.2)											
	Total Taxa	25	25	21	24	19	25	21	22	33	22	27
	EPT Taxa *	5	7	6	7	5	4	3	5	7	5	7
	% OC	25.0	23.0	65.2	49.0	11.1	10.2	14.1	22.8	32.1	25.4	61.8
	% EPT	38.0	24.0	25.8	13.6	9.4	7.2	6.1	19.7	11.7	11.9	7.5
	NCBI	5.65	5.55	6.14	5.28	5.27	4.90	4.92	4.91	5.10	5.59	5.08
	% Dominant	24.0	35.0	41.2	26.2	69.1	53.8					
	% Nut-Tol							82.2	70.0	73.3	53.5	28.1
	% Cling	62.0	48.0	61.4	43.4	73.5	65.3	61.0	7.3	60.8	52.4	29.6
	TMI	32	30	24	26	22	26	20	20	26	24	24


40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
%EPT
9/1/2001
10/1/2002
11/1/2003
12/1/2004
1/1/2006
2/1/2007
3/1/2008
4/1/2009
5/1/2010
6/1/2011
Date
Sta 1
Sta 2
Sta 3



100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
%NUT Total
9/1/2001
8/1/2002
7/1/2003
6/1/2004
5/1/2005
4/1/2006
3/1/2007
2/1/2008
1/1/2009
12/1/2009
11/1/2010
Date
Sta 1
Sta 2
Sta 3

: Franklin's/CDM-Smith's Draft Final (7/2012)

g.Chen Shiao

: Wednesday, October 17, 2012 2:12 PM

Gary Davis

Sherry Wang

ıage ES-2, it talks about showing 4 alternatives in Figure ES-1, which, however, has 5 objectives (excluding Do Nothing). I dn't figure out how these 5 objectives were used to formulate the 4 alternatives (i.e., different model inputs). TDEC should est that CDM explains the methodology used to construct the model inputs in the report. Also, there are 8 alternatives in Table . Are we the only people reading this report?

---

n: Gary Davis

t: Wednesday, October 17, 2012 7:18 AM

Ming.Chen Shiao

ject: RE: Franklin's/CDM-Smith's Draft Final (7/2012)

ection 4.2.2.2 - I've attached Appendix A which was referenced on p. 3-14 (p. 3-15 probably provides info re: 4 alternatives - ever, I'm not sure yet - still its not clear - please see Figs ES-1 & ES-2 per today's email attachment).

ection 4.2.2.5. - current permit's monthly average limits ->CBOD5 = 400 lb/day (summer) & 1,001 lb/day (winter)

ie call me to discuss. (Soon, I'll email you my request for the add'l model runs we discussed yesterday.)

ks

Davis

: - Division of Water Resources

532-0649

ı: Ming.Chen Shiao

: Tuesday, October 16, 2012 2:37 PM

Gary Davis

ect: RE: Franklin's/CDM-Smith's Draft Final (7/2012)

couple comments on the Draft Final.

hat are the alternatives 1, 2, 3, and 4 presented in Section 4.2.2.2 ? There are six alternatives on page 4-15, but it doesn't tell which is what.

ıe EPA TMDL BOD loadings (Sec. 4.2.2.5) are highly questionable. Do we have to compare with those numbers?

ı: Gary Davis

: Tuesday, October 16, 2012 11:02 AM

ling.Chen Shiao

ect: Franklin's/CDM-Smith's Draft Final (7/2012)

ır tel conversation this morning, I've attached the draft final doc - please look at the modeling/Harpeth River WQ parts & let me what you think.

ks

Davis

- Division of Water Resources

32-0649

From: "dorie bolze" <dorie@doriebolze.com>
To: "'Paul.Estill Davis'" <Paul.Estill.Davis@state.tn.us>, <david.draughon@state.tn.us>, "'Saya Qualls'" <Saya.Qualls@state.tn.us>, <sherry.wang@state.tn.us>, "'Joey Holland'" <Joey.Holland@state.tn.us>, "'Jimmy.R Smith'" <Jimmy.R.Smith@state.tn.us>, <sherry.wang@state.tn.us>, "David Duhl" <david.duhl@state.tn.us>, "'Paul Sloan'" <Paul.Sloan@state.tn.us>, "'Patrick Parker'" <Patrick.Parker@state.tn.us>, <wade.murphy@state.tn.us>, "Gary Davis" <gary.davis@state.tn.us>, "Robby Baker" <Robert.d.baker@state.tn.us>, "'Gregory Denton'" <Gregory.Denton@state.tn.us>, "Richard Cochran" <Richard.Cochran@state.tn.us>, "'Edward Polk'" <Edward.Polk@state.tn.us>
Date: 10/3/2006 9:28:39 AM
Subject: Harpeth DO and TDML-- conf. call with EPA, Franklin on Oct. 10, others from TDEC welcome

Hello everyone at TDEC!

I put quite a few folks on this email to make sure it got around that I'm not even sure how best to address it!

I was speaking to Saya yesterday to set up a meeting Oct. 9 on Lynwood, and told her about the oct. 10 conference call we have organized at the behest of the city of Franklin and EPA's TMDL branch. The email is below. This conf. call, in the morning will be to discuss the latest field data on Dissolved oxygen in the Harpeth, the work we contracted to work with the EPA's river models, and to look a flow as it relates to DO (tied to the proposed expansion of the Franklin drinking water plant.)

Sherry Wang and Jimmy will be on the call, but by all means others are welcome. I did learn yesterday with Saya that there is now a big meeting on an aspect of the water quality standards for Oct. 10 in the morning. So some of you will undoubtedly by there.

It would be good if someone involved with the NPDES permits on the Harpeth was on the call since the larger issue will be to discuss what the field data is indicating and then next steps related to the 3 discharge permits that are up for renewal this fall and how to deal with the summer time low-flow DO violations in the Harpeth. This conference call is a starting point for working on this broader issue and we are really looking forward to working with TDEC on this.

The conf. call will be Oct. 10 at 9:30 to 11:00. I will send out an agenda later this week with the call in information. I will also circulate the water quality study we had contracted for us, our recent DO data on the Harpeth, and above is Jimmy's latest that he coordinated with HRWA. I know many of you will be out for the rest of the week, but you will have this when you come in Monday.

If you could let me know who wants to call in, I can make sure you get the material, but I will be safe and just send it to everyone.

THANKS!

Dorie

Dorie Bolze
Executive Director

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Working Together To Protect the Harpeth River and Provide Expertise in State Conservation Policy

-----Original Message-----
From: dorie bolze [mailto:dorie@doriebolze.com]
Sent: Tuesday, September 19, 2006 4:54 PM
To: 'scott.woodard@cte.aecom.com'; 'Newby, Art'; David Parker (dbparker@bellsouth.net)
Cc: 'Mike Corn'; 'John Michael Corn'; William Melville (Melville.William@epa.gov); 'Randy Wetmore'; 'Jay Johnson'; HRWA-Pam (hrwa-office2@harpethriver.org); John McFadden (jmcfadden62@bellsouth.net); 'sherry.wang@state.tn.us'; 'Jimmy.R Smith'; Paul Gagliano (gagliano.paul@epa.gov); Tim Wool (Wool.Tim@epa.gov)
Subject: CTE's water quality data-- is it available? and conf call with EPA, TDEC on Aquaeter study and field data 2nd week of Oct.

Hello David, Scott and Art,

I spoke to Bill Melville at EPA today about Aquaeter's report. He mentioned that he had talked to Art Newby recently. Bill called to set up a conference call the second week of October to have HRWA, EPA, TDEC, and city/CTE folks on to look at the more recent field data on DO, discuss the Aquaeter report, and discuss things that could be done with the TMDL. This meeting once HRWA has a draft report was what we had agreed we would do back in early August. One key point we discussed was that there are more field data since EPA's work in 2000 and 2001. This data by TDEC is in the Aquaeter study. Also, in 2 weeks we will have a draft of our field study that we are conducting with TDEC so we covered 2006. In our study we hope to have gone far enough down river to find the point when the DO is no longer below state standards. Also, HRWA, TDEC and CTE have been up from Franklin also.

As Bill discussed with me, the TMDL runs in the TMDL report assumed that the river coming into the sewage treatment plants was meeting DO standards-- something like 5 or 6 mg/l. But, the field data are indicating that this is not the case in the low-flow summer time. The DO can get well below standards. I quote from CTE's p. 10 of the water availability study, because it looks like CTE also have DO data from Oct. 2005 and found DO at very low levels around the Franklin area of the river. Bill Melville at EPA says that if the DO is not 5 or more coming into the sewage treatment plants, then one thing he wants to discuss is re-running the TMDL models with actual DO readings to give a more accurate picture of what is going on in the river, where water withdrawal cutoffs would be to avoid causing DO violations, but also to start looking at effluent management in the summer low flow conditions (for all 3 STPs on the Harpeth).

We have begun circulating Quarter's DO study to TDEC, and we circulated

TDEC field data. We will circulate HRWA/TDEC's 2006 field data as soon as we get it all in which I hope is before the upcoming conference call meeting that EPA would like to have set up the second week of October. Hopefully CTE can circulate their data as well and we can all discuss this on the conference call.

So, with this email:

Could I hear from folks what dates and/or times Oct. 9, 10,11, 12 work.

Bill Melville is going to coordinate from EPA's end to have the folks involved in the TMDL on line.

Sherry-- could you let me know for this first meeting/discussion who is best from TDEC. I sent it to you as the state TMDL expert and to Jimmy Smith since he is the field biologist who has gathered this data over the years. You may want others on or we can start here and then arrange a meeting at TDEC in person with presentations. Something to discuss on the call.

CTE and Franklin

I think we should plan for 2 hours and make sure there is time to come up with next steps in that timeframe. Bill and I can pull together an agenda for folks in the call that we can circulate.

Thank you very much,

Dorie

FROM THE CTE Water Availability Study in June for the Harpeth River.

"The following is a summery of the field data: Temperature Range 6 to 23.3 deg, C, DO Range 2.7 to 11.7 ppm, Flow at Hwy 96 (R3) 2.8 to 31,9 cfs, Flow at Arno Road or I-65 1.5 to 37 cfs, Average Depth at Riffle 1.9 to 9 inches, Wetted Width at Riffle 12 to 9 inches, Wetted Width at Riffle 12 to 61 inches, Toe of Bank Width 51 to 83 feet,. These data were collected during one of the driest Octobers on Record. Total rainfall for the month of October recorded at the Nashville Airport was only 0.02 inches and at the Franklin STP 0.12 inches."

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Working Together To Protect the Harpeth River and Provide Expertise in State Conservation Policy

From: Saya Qualls
To: Davis, Gary; Polk, Edward
Date: 10/9/2006 1:47:08 PM
Subject: Fwd: comments concerning HRWA consultant reports

This is the consultant e-mail that PED was talking about. CTE is handling the proposed withdrawal. The first attachment, "Comments on Water Quality" should be of interest.

saq

>>> "Woodard, Scott" <scott.woodard@cte.aecom.com> 09/26/06 5:15 PM >>>
Robby,

Thanks for your time again today on the phone. I understand that you wish to hold internal discussions prior to scheduling additional meetings. As we discussed, we have prepared comments addressing each of the reports produced by the new HRWA consultants. I am also copying the others that you mentioned during our conversation that will be involved in your internal meeting.

Please let me know if you have any questions or wish to discuss these comments or the application process further.

Thanks,

Scott

COMMENTS
ON
WATER QUALITY ANALYSIS
OF THE
HARPETH RIVER
BY
AQUAETER
FOR HRWA

September 19, 2006

The authors of the draft report use the first nine pages analyzing EPA's Total Maximum Daily Load (TMDL) report, hardly mentioning anything that is related to the City of Franklin's Aquatic Resource Alteration Permit (ARAP) application; which is the current issue. EPA's TMDL report uses computer modeling to estimate the effect of various combinations of pollutant loadings (including the City of Franklin's wastewater treatment plant (WWTP)) on the Harpeth River at low summer flows. As the report correctly points out, federal and state law requires that water quality standards be met at the calculated low flow (7Q10), which the US Geological Survey has calculated to be 0.3 cfs. However, the report says that the EPA used a flow of 17 cfs and argues that the report shows that more flow is needed to achieve water quality standards, so Franklin should not withdraw water. This is incorrect.

It would have been ridiculous for EPA to say that the water quality standards must be met at 0.3 cfs and then do all of its analysis at 17 cfs. The TMDL report shows the flows in the river above Franklin to be from zero to 0.3 cfs, and then says that the upper river CE-Qual model results were coupled with the WASP model at the dam. In addition, Bill Melville of EPA stated clearly that EPA had to artificially increase the flows at Franklin from 0.3 cfs to 1.0 cfs, because the WASP model was unstable at 0.3 cfs. Thus, most of the discussion in the first nine pages of the Aquaeter report is invalid.

Even if it were, however, they may be ascribing too much precision and accuracy to the results of EPA's modeling effort. EPA's WASP model is very sophisticated, but also very complex and data-intensive. There are over 20 variables, constraints, and coefficients which must be either measured or estimated and inserted into the model. EPA did not do enough field work to measure more than about 5 or 6 of them, and the rest were estimated. Thus, the resulting output, while generally a fair description of the behavior of the Harpeth River under normal conditions, should not be considered precise or all-encompassing. Aquaeter even agrees, since its final recommendation is for a major field study which will measure many more of the important coefficients.

The main point to keep in mind, however, is that, in all cases when the 7Q10 flow is being approached, and low dissolved oxygen content in the river may become a problem according to EPA's modeling estimates, the City of Franklin's water treatment plant will not be withdrawing water at all. According to the guidelines proposed in the ARAP application, no water would be withdrawn at river flows of 5 cfs or less.

Also, even though they say that they examined Sulkin's 1987 report, they did not report his major conclusion. He found that, at very low River flows (and velocities); the DO was actually higher when the Franklin Wastewater Treatment Plant discharged <u>more</u> effluent. This conclusion, while it may be counter-intuitive, can be easily explained. At low flows, detention time of water in the pools of the pool-and-riffle Harpeth, where essentially no reaeration takes place because of low velocities, is very long, so bacterial respiration has a long time to utilize oxygen before the water gets to the next riffle. When the WWTP discharge is doubled, the detention time is halved, and the oxygen depletion is halved. This works as long as the WWTP effluent is highly treated, with BOD less than 5 mg/L and DO of over 8 mg/L, so the extra BOD of more effluent doesn't outweigh the extra reaeration caused by higher River velocities and the reduced time for oxygen depletion in the pools. This is confirmed on p. 53 of EPA's TMDL document, where they show that the oxygen sag below the WWTP is less when the WWTP is discharging 12 mgd than when the WWTP is discharging only 6 mgd.

The biggest problem with the report however, is the major over-generalization of their "rule of thumb" on pages 10-11, and the fact that they were highly selective in which data from Figure 5 that they selected to make their point. They say that the Harpeth River needs 100 cfs to protect the DO from dropping below 5 mg/L because the DO on August 5, 2002, did not rise above 5 mg/L at mile 84.4 below the WWTP until the flow approached 100 cfs. However, there is no evidence that the sharp drop in DO on August 2, 2002, was caused by the WWTP. The WWTP flow did not increase from July 31 to August 2, and yet the TDEC data show DO dropped from 5 mg/L to 2 mg/L, and later to zero.

Also, the River flow did not decrease. In fact, the best DO was Sept. 11-15, when Harpeth River flow was only 5 cfs. Something other than decrease in River flow or increase in WWTP flow caused the DO drop, so you cannot say it was necessary for more River flow, or less Water Treatment Plant withdrawal to correct it.

In Figure 4, the DO at mile 84.4, <u>below</u> the WWTP, dropped to zero on August 4, 2003, but no evidence that the WWTP caused it by increasing flow or BOD load. However, the DO at mile 87.7, <u>above</u> the WWTP, dropped sharply on July 31. That drop could not be attributed to the WWTP. The DO at mile 79.8 and mile 45.0 dropped even earlier. Something else, other than the WWTP must have happened. What was it?

Other data, not shown in their report, could explain it. If one plots the rainfall at the WWTP and river flow on the same scale as Figure 4, one sees that a rainfall event of about 0.75 in. on July 29 caused River flow to double, from 10 cfs to 20 cfs. There could have been more rain at other locations, then or at other times, on the tributaries. The DO began to drop at all four stations soon afterwards. The first to drop was mile 45.0, and at all four stations soon afterwards. The last station to show a serious drop was at mile 84.4, just below the WWTP. The DO at mile 87.7, at Main St., above the WWTP, dropped sharply before that at mile 84.4. Thus, the WWTP could not be responsible.

We believe that these two sharp drops in DO, in the absence of increased WWTP flow or loading, was due to the rainfall events following long periods of low flow (below 20 cfs) but adequate DO, which caused runoff containing BOD from non-point sources, or from the extra flow stirring up the sediment on the River bottom, converting slow-acting SOD to fast-acting suspended BOD, or both.

Thus, Aquaeter's over-reliance on their "rule of thumb" is totally inappropriate in this case. It ignores the fact that for much of the time in Figure 2-4, the DO was adequate at all stations, when the Harpeth River flow was only 5 cfs, well below the 100 cfs they say should be the Water Treatment Plant cutoff. It also ignores the fact that this "rule of thumb" is primarily for secondary treatment plant effluent, with BOD of 20-30 mg/L, discharging into normal free-flowing streams, and not for highly-treated effluent like Franklin's discharging into a pool-and-riffle stream like the Harpeth River.

There is no sensitivity analysis or other discussion presented by Aquaeter to show that the proposed withdrawal strategy would have a measurable effect on the DO below the WWTP. We do not believe that it would, and that is why we placed the proposed 20% of flow withdrawal limit in the APAP permit application. There is no credible evidence whatever to support a 100 cfs withdrawal cutoff, and much evidence and experience to refute it, even in Aquaeter's own report.

COMMENTS
ON
FRANKLIN WATER TREATMENT PLANT
CTE ECONOMIC ANALYSIS REVISITED
BY
WILLIAM W. WADE
FOR HRWA

September 19, 2006

Mr. Wade correctly states that rank ordering of single-point cost estimates is insufficient for such a complicated issue. That is why more than one year of study has been performed to develop a withdrawal strategy protective of the environment and a detailed water treatment plant design report to evaluate the full range of alternatives (a requirement of ARAP withdrawal permit applications). It is unfortunate that Mr. Wade did not spend time talking with CTE staff that performed the studies rather than blindly developing incomplete conclusions based on his limited involvement in the project. In fact, Mr. Wade did not begin review of this project more than two or three weeks before filing his report utilizing incorrect assumptions that lead him to incomplete conclusions.

The following sections cover what seem to be the issues Mr. Wade attempts to call into question.

Suggestion that questions remain

It appears that Mr. Wade is attempting to suggest that our analysis is incomplete and that more questions remain unanswered. Such tactics can be effective in creating a sense of doubt or supposed incompleteness when one desires to impact or slow such a project. No matter the level of study that could have been performed, anyone with even limited understanding could raise questions that are not answered; no matter how insignificant.

Use of wet and dry year and period of record

Mr. Wade suggests that we utilized only one year to represent a wet year and a dry year to draw our conclusions. He also states that "CTE report does not show effect of entire hydrologic record on purchases." This is not true. We utilized 28 years of data from the USGS gauge located at Highway 96 in downtown Franklin. Mr. Wade attempts to develop a representative wet and dry year for his analysis based on our 28 years of data. Utilizing the entire period of record is more accurate than developing a statistical dry and wet year. The impact of the varied water availabilities on an annual basis is demonstrated in our Water Availability Technical Memorandum. The TM demonstrates that more water will be available in some years than others. Further it is not as easy as a statistical wet and dry year. These do not take into account the unique nature of the Franklin plant and raw water reservoir. Some years, water withdrawal may not be possible in varied times during the year; this cannot be determined by simply calculating a dry "year". To accomplish the true impact, it is more appropriate to introduce the proposed withdrawal scheme to the real 28-year period of record; and that is what we have done. The numbers we present are based on the entire period of record, not on one wet or one dry year.

Purchase rate analysis

Mr. Wade suggests that $1.71/1000gal should be utilized for all analysis. This is inaccurate if the existing rate structure is utilized. It would require a quadrupling of the current level of water purchase for this to be true. That type of demand is no where near what is expected in the 2020 projections. It would be inappropriate to assume or suggest that any additional contract negotiations could reduce current rates for this analysis.

Mr. Wade's suggestion also does not take into account the 12MG expansion planned by HVUD which must be funded by customer rates (including wholesale customers). Nor does it consider the removal of the plant as a supplemental source of water. Just this year there were multiple times that the system could have seen significant impact if Franklin's WTP were not in operation.

Additional data from Franklin and HVUD also made it possible to develop a more detailed evaluation of rates and volume purchase impacts. However, the data still demonstrate that the treatment plant upgrade is economically feasible. The analysis amounts to an update of the previously developed alternatives tables. The updated tables are included as an attachment.

Planning period

Mr. Wade suggests a 30-year planning period would be more appropriate for such an analysis. We agree. However, the City's active planning document projects future growth only to 2020. Therefore, we determined the most appropriate planning year to evaluate would be utilizing numbers from City planning documentation.

However, because we do feel a longer term planning effort is appropriate, CTE has further project growth expectations for the City's service area through the year 2036 (30 years). Although additional large projects are planned in the City of Franklin, evidently Mr. Wade did not research the actual service area of the City's water distribution system. Although the city expects continued growth, much of the growth will take place within other utility service areas.

An additional chart was developed based on this further evaluation. The attached figure demonstrates the cost comparison for the various alternatives over a 30-year period. This analysis demonstrates what was understood but was unsaid in our original analysis. Although there is real savings in the first 20-year period with plant expansion, a much greater savings per year is realized once the plant expansion is fully funded after the first 20 years.

Risk of reliance on HVUD

Mr. Wade states that "The alternative of HVUD supplies makes explicit consideration of risks of reliance on HVUD compared to withdrawals from Harpeth River a necessary part of the decision process – risks as perceived by all stakeholders." We agree. The proposed plant is not only economically feasible, it provides valuable redundancy. Something that is quite important in today's strained water availability environment.

General comments and response to Wade report

We believed from the beginning that this would be a successful process no matter the outcome. We truly entered this project not knowing the outcome of the river data study and analysis nor the economic analysis. If the model (selected based on TWRA recommendation and deep discussions with HRWA and with the model's creator at The Nature Conservancy) had shown results that pointed to no withdrawal was the right alternative, then that would have been the conclusion. However, it is interesting that now HRWA avoids evaluation of the data and only makes a blanket statement that they do not support our conclusions. We would like to see the scientific result supporting their position just as we have provided. A statement that "we like the higher cutoff" is not sufficient.

The City and CTE built a technical team that provided a complete analysis of all required elements of the ARAP permit application process. It has included input from EPA, TDEC, TWRA, USGS, FWS, community and other stakeholders such as HRWA over more than a twelve month period. The City of Franklin has spent extensive time, staff and monetary resources to achieve the type of study that TDEC has desired and required for this permit application.

We ask that TDEC consider the scientific study and the findings in evaluating this permit application. A low flow cutoff more than six times the 7Q10 coupled with a protective 20% maximum withdrawal rate above the low flow cutoff (5cfs) is protective of the designated uses of the Harpeth River in Franklin.

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Date: 9/25/2006 9:39:41 AM
Subject: Harpeth River: Lynwood- recent letter from TDEC, new analysis on summer time low Dissolved oxygen, Franklin ARAP for drinking water plant

Hello Paul Sloan and TDEC water pollution control staff and TDEC legal staff,

Attached are 3 documents regarding several interconnected issues for the Harpeth.

1. Lynwood STP-- recent letter from TDEC regarding sewer.

The first is a letter from HRWA regarding recent efforts by the developer David Schwab and Lynwood utility regarding the possibility of 350 more taps for Lynwood to serve this proposed development. The second file in pdf is a review of the engineering analysis provided to TDEC by the Lynwood consultant.

This material covers concerns that TDEC's WPC letter August 15 to Lynwood essentially approved a permit modification without followed required permit modification public process. We are also concerned with engineering weaknesses in the utility consultant's work.

We believe that the TDEC WPC letter needs to be rescinded to get the time needed to address all of this appropriately and avoid the perception that sewer is available for this proposed subdivision at the upcoming October 12 county planning commission meeting. The development is NOT approved by the county, but TDEC's letter will be interpreted as the development does have sewer. As HRWA has noted in our letter on this in April, we are very concerned that any more approved hook-ups will jeopardize the county's septic sewer hook-up project that Lynwood's remaining capacity is reserved to serve. The sewer reserve was Paul Davis and other WPC staff important effort when the Lynwood plant proposed to expand a few years back.

2. Low dissolved oxygen levels in the Harpeth in the summer-- recent field data and relationship to upcoming 3 NPDES point source permits.

Also attached is a copy of our very recently completed study of the dissolved oxygen water quality problems in the Harpeth in the summer low flow times. TDEC field data from 2002 and 2003 along with EPA's in 2000 found severely low dissolved oxygen levels in the river far below state standards to where there have been conditions of high risk to public health and for fish kills. We also have been working with TDEC field staff to conduct a field study (just about complete) of the dissolved oxygen conditions for this year. From the field data and review of the EPA TMDL river models, these conditions are caused from having too much sewage treated effluent in the river during these low flow months.

Thus, this fall, all 3 NPDES sewage treatment plant permits (this includes Lynwood) will need to be adjusted. We have provided this work to EPA, TMDL branch in the last 10 days and are in the process of setting up a conference call with relevant TDEC staff, EPA, and others to look at the field data, the report, and discuss options-- such as re-running the EPA models to reflect field conditions. Essentially field conditions in the summer--Aug, September, Oct--are finding low DOs ABOVE the first sewage treatment plant, in the same area of the proposed water withdrawal (see item 3 below). According to Bill, the EPA river models were run assuming the river's water came into the sewage treatment plants meeting DO standards- somewhere around 5 or 6 mg/l. Yet, the field data are coming in around 2 and 3 mg/l above the first plant, and staying at 2 and going as low as 0 mg/l (and staying this low for days in one recorded situation by TDEC in 2003) below the plants.

3. Franklin's ARAP for an expanded drinking water plant.

The DO field study also has bearing on the recent Franklin proposal for an expanded drinking water plant. As the report and field data indicate, the withdrawal scenario for the proposed plant involves withdrawing at low river flows when these water quality violations have been recorded to occur. HRWA sent to TDEC staff a month ago an economic analysis of the various options for Franklin for drinking water. At the time the new rate forecasts from HVUD were not out, but based on all the information provided in mid-August by the city's consultant's analysis, the cost for a new drinking water plant was essentially the same as the city getting all it's water from HVUD which provides the city with a significant portion of its water needs. HVUD's rate forecasts are now out and we have been working with HVUD to provide TDEC with further information regarding economic aspects of this issue. Note, these analyses were based on 2 withdrawal scenarios: a 5 cfs cutoff with 20% withdrawal above and a 10 cfs cutoff with 20% withdrawal.

The water quality issues in the Harpeth are also relevant to the city's existing drinking water plant and current withdrawal practices. The city currently does not have an ARAP to withdrawal and does withdrawal to as low as 1 cfs and until recently even lower. From field data and the analysis in the third report attached, the Harpeth is experiencing low DOs significantly below standards at river flows by the drinking water plant of 17 cfs and higher. Any removal of water in the river at low DOs, exacerbates the condition which affects the point source discharge's ability to not cause DO violations just a few miles downstream. Thus, not only does the ARAP proposal for an expanded drinking water plant and that water withdrawal scenario (base cutoff of 5 cfs with 20% withdrawal above) need to be reviewed with respect to the affect in water quality standards (as was done in the third file attached) but the current drinking water plant's withdrawal practice will have to be reviewed as well.

HRWA would love to work with TDEC and have already talked to EPA's TMDL branch and with Paul Sloan about how to create a a joint decision-making process that includes the 3 sewer plant permit holders, HRWA, TDEC, and EPA in developing a plan to improve the river's summer time conditions.

We will start this week in setting up a format for having our experts come to present to TDEC and hold some discussions that would include the various permit holders and their consultants as well. We are really looking forward to working with TDEC on these core issues for the Harpeth.

Thank you for your quick attention to the Lynwood STP issue,

Dorie

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Per AquAeTer's "The AquAeTerian" Vol. 10/Fall 2008

10-22-08

FEATURE ARTICLE

COMPARISON OF $CBOD_U$ TIME-SERIES BOTTLE RATES WITH ACTUAL STREAM $CBOD_U$ DEOXYGENATION RATES

Many of today's water quality models utilize a fast (labile) and slow (recalcitrant) deoxygenation rate for ultimate carbonaceous biochemical oxygen demand ($CBOD_U$). These rates are developed from laboratory analyses of $CBOD_U$. In 1980, Dr. Ray Wittemore of the National Council for Air and Stream Improvement (NCASI) conducted the first set of long-term (approximately 365 days) time-series $CBOD_U$ and ultimate nitrogenous biochemical oxygen demand (NBOD) tests that identified both a fast and slow $CBOD_U$. Dr. Wittemore was able to determine from the 5-gal glass carboy BOD tests that pulp and paper mill wastewaters had both a labile or fast oxygen demand from $CBOD_U$, and a slow or recalcitrant $CBOD_U$ demand. NCASI did not measure the actual river deoxygenation rate for $CBOD_U$ during these studies conducted in 1980. **AquAeTer** has been conducting studies for a number of pulp and paper clients, measuring time-series BOD's from pulp and paper mills and in the streams receiving these effluents. In addition to the laboratory analysis, we have also measured the actual river deoxygenation rate for $CBOD_U$. As will be discussed, the river deoxygenation rate for $CBOD_U$ cannot be measured in a laboratory BOD test.

The term labile simply means that the parameter, whether it is carbonaceous BOD, organic nitrogen, or organic phosphorus, is readily degradable or is transformed within a reasonable period of time. The term recalcitrant means that the parameter is not readily degradable or does not transform within a reasonable period of time. In wastewater treatment, this time limit is usually on the order of a few hours to a day, depending on the retention time of the treatment system. In river systems, a reasonable period of time can easily extend from a few days to many weeks.

There has been much discussion recently on modeling stream $CBOD_U$ decay using separate labile and recalcitrant $CBOD_U$ decay rates based on decay rates measured in BOD test bottles in the laboratory. **AquAeTer's** staff of engineers and scientists have measured $CBOD_U$ deoxygenation rates in various rivers and streams, as presented in Figure 1. The rates determined for the rivers do not match the rates developed from individual samples in the bottle analyses. The bottle rates are at times greater (faster deoxygenation) and at other times less (slower deoxygenation) than the rate developed from measurements of $CBOD_U$ decay with time of travel downstream in the river system, i.e., the true $CBOD_U$ deoxygenation rate. In addition, the amount of recalcitrant $CBOD_U$ decay to our knowledge has never been measured nor has it been documented that a separate rate exists in river systems for this recalcitrant fraction of the $CBOD_U$ in the river. Therefore, a separate rate for the recalcitrant $CBOD_U$ is not discernible within the river, if it even exists.

In Figure 2, both the labile and recalcitrant $CBOD_U$ can be clearly determined using the Georgia Environmental Protection Division (GA EPD) LTBOD program for analyzing laboratory time-series BOD data originally developed by Dr. Roy Burke. These samples were set-up in the field without icing or introduction of foreign seed into the bottles, i.e., represents oxygen uptake from the in-situ suspended bacterial population existing in the river itself. It is interesting to note that in this test, the nitrogen decay began in this sample at time zero and the recalcitrant $CBOD_U$ oxygen uptake began between about 10 and 20 days into the test. The labile fraction of the $CBOD_U$ in this time-series BOD test had a deoxygenation rate of 0.086/day at 20°C. The recalcitrant $CBOD_U$ is ubiquitous in all river $CBOD_U$ samples collected regardless of whether there is an effluent source in the river where the sample is collected or not.

The actual measured $CBOD_U$ deoxygenation rate determined from the time-series BOD tests collected with dye time of travel (the median point in the dye mass) is also presented in Figure 1 and was calculated to be 0.35/day at 20°C. **AquAeTer** measured the river $CBOD_U$ decay rate by collecting time-series BOD samples at the median point of a dye-slug injection as it moved downstream. The measured bottle rates in this instance, (and in almost all other cases where we have measured actual river $CBOD_U$ deoxygenation rates), did not match up with the laboratory bottle $CBOD_U$ deoxygenation rates. If one developed a model using the bottle rate of 0.06/day, the calculated deoxygenation rate would have been greatly underestimated. In order to make the model results balance, another rate parameter would have to be adjusted in order to meet the target dissolved oxygen concentration in the river, thereby compounding the inaccuracies of the model. The use of the bottle rate in this case would have grossly underestimated the impact of the $CBOD_U$ effluent loadings on the river dissolved oxygen concentrations in the subsequent wasteload allocation modeling, and another rate parameter would have had to be adjusted to balance the oxygen uptakes and additions. Many modelers with poor understanding of river kinetics use the sediment oxygen demand (SOD) rate to adjust for this inaccuracy and thereby produce a model that is not predictive or accurate and must be recalibrated to accommodate differing conditions.

In general, in the 1,000 or so time-series BOD tests that we have run, $CBOD_U$ bottle rates typically range from 0.05 to 0.2/day. As can be seen from Figure 1, river $CBOD_U$ deoxygenation rates, shown for a wide variety of streams from deep reservoir settings to small low-flow pool and riffle streams, never come close to the laboratory bottle rates. Simply stated, use of the individual time-series bottle $CBOD_U$ deoxygenation rates in a mathematical model will not be an accurate predictive tool for establishing wasteload allocations. Additionally, of the 30 or so dye time of travel $CBOD_U$ deoxygenation rates that we have measured, we have never been able to discern or measure a second stage or recalcitrant $CBOD_U$ deoxygenation rate during time of travel wasteload allocation studies in the river system. This rate may be immeasurable in the river or the actual river bacterial populations may not discriminate. Regardless, the recalcitrant $CBOD_U$, when the BOD test is run correctly, constitutes a small portion of the total $CBOD_U$ in the river system.

For more information about the content of this article, please contact John Michael Corn at jmcorn@aquaeter.com or 615-373-8532.

FIGURE 1. ACTUAL IN-SITU MEASURED RIVER $CBOD_U$ DEOXYGENTATION RATE

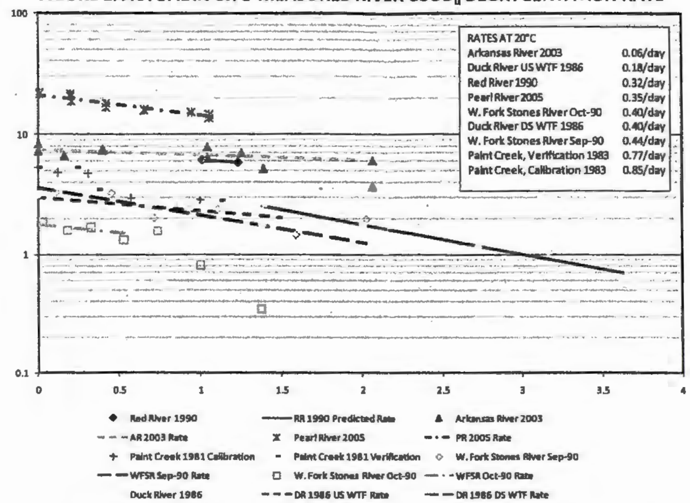
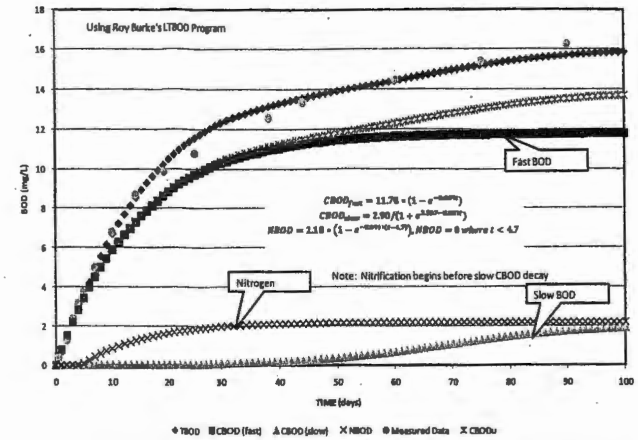


FIGURE 2. BOD ANALYSIS - MILL MIXED WITH BACKGROUND RIVER WATER



JOHN MICHAEL CORN, P.E.

615.373.8532 jmcorn@aquaeter.com

John Michael Corn has been with **AquAeTer** for over four years and has more than five years of environmental engineering experience. Mr. Corn graduated from University of Tennessee with a B.S. in Chemical Engineering. His work at **AquAeTer** has included projects such as, water quality assessments, air emissions calculations and modeling, environmental litigation support, dispersion studies, groundwater investigations, geomorphologic analysis, wastewater treatment selection, bioaccumulation, and environmental site assessments. He has been involved in environmental sampling, bench and pilot-scale studies, groundwater tracer tests, site assessments for spill prevention, control, & countermeasures plans, wastewater allocation studies, design of single-port and multi-port diffusers, statistical distribution analyses, emissions estimations for facility permitting, toxicity testing, surface water remediation, project planning and budgeting.

From: "Edward Polk" <e.polk@comcast.net>
To: <Gary.Davis@state.tn.us>
CC: <Sherry.Wang@state.tn.us>
Date: 12/18/2008 7:48 AM
Subject: Article by Mike Corn
Attachments: CBOD Decay Article Review.doc

Gary:

I have reviewed the article by Mike Corn. I can't conclude that he is right or wrong based on the limited data presented. I have attached my comments.

Ed Polk

Gary:

I have read the article by Michael Corn an find it to be generally well written and his data does make what is potentially a valid point. Here are some of my thoughts on the subject:

1. Mike implies that the actual CBODu as measured in the stream decays with time faster than the CBODu decay rate measured in the laboratory bottle. This is certainly plausible, and this concept has been used by EPA and the State in the past to justify using high decay rates (higher than bottle) for modeling. I have not read a good explanation of why the bacteria feed faster in the stream than in the bottle, perhaps the turbulence.

2. Figure 1 does not have x and y coordinate labels. I assume that the y axis is BODu and that the x axis is time in days? It appears that most of the streams studied start out at a BODu of 5 mg/l or less and drop to 2 mg/l or less in about 3 days. I would expect the inherent variability of BOD in stream samples (even following the centroid of a dye trace) to be greater than 1 mg/l. There also can be other inputs and sinks for BOD in the stream. Thus I am skeptical of these low BOD samples taken along the stream as being accurate of true decay.

3. The stream samples collected and set up for CBODu analysis required precise measurements of DO over a 100 day period to show a 1 to 3 mg/l drop. The 5-day BOD was probably less than 1 mg/l. There is not much room for error here. Figure 2, however, shows an example of a BODu of 12 mg/l after 100 days. The point is that this type of sampling an laboratory analysis works much better for a stream that starts out at a CBODu of 20 mg/l (and a 5-day BOD of 3 mg/l) rather than a stream that starts out at a CBODu of 4mg/l (5-day CBOD of 0.5 mg/l.

4. In applying this type of analysis to a stream, one must make a choice. If we claim that CBOD oxidation rates are high, then CBOD decays rapidly, causes a pronounced oxygen sag, and the stream recovers after most of the CBOD is gone. If we assert that CBOD decay rates are low, then the CBOD decays slowly, the oxygen sag is not as pronounced, but the CBOD and affects on DO are carried much further downstream. However, I cannot justify from this article a mechanism where a relatively small BODu discharge source (<5 mg/l) can cause both a significant DO sag in the short term (1 to 2 days downstream) and at the same time cause a significant DO sag in the long term (10 to 30 days downstream). As long as there is some reaeration, you just can't have it both ways.

5. It is certainly possible that underestimation of CBOD decay rate can cause modelers to assume that another mechanism, such as SOD, is

adding to the oxygen uptake. However, before I would want to make that accusation, I would want SOD measurements to back me up. Were there any such measurements made in the seven streams studied? I have only experienced one case (a stream near Willmington , SC) where the DO levels were lower that predicted by the CBOD decay rate. We used benthic respirometers to show that the benthic demand was a significant contributor to the stream DO issue.

6.

From: Gary Davis
To: Polk, Edward
CC: Wang, Sherry
Date: 12/18/2008 8:32 AM
Subject: Re: Article by Mike Corn

Ed
We appreciate your quick response and valuable input. I spoke with Sherry yesterday & expect to consolidate our thoughts soon.
Thanks
Gary

>>> "Edward Polk" <e.polk@comcast.net> 12/18/2008 7:48 AM >>>
Gary:

I have reviewed the article by Mike Corn. I can't conclude that he is right or wrong based on the limited data presented. I have attached my comments.

Ed Polk

From: Bruce Evans
To: Gary Davis
Date: 12/18/2008 9:08 AM
Subject: Fwd: Re: Long Term BOD
Attachments: Comments to AquAeTer.doc

Gary

Attached are Ming's comments.

>>> Ming.Chen Shiao 10/28/2008 10:31 AM >>>
Saya/Sherry/Bruce,

Attached is my comments. Let me know if you have any questions.

Ming

>>> Bruce Evans 10/23/2008 12:49 PM >>>
Ming, Tom

Sherry asked me to send you the attached article for your perusal. The article came from an AquAeTer newsletter that was passed on to me by Gary Davis of the Permit Section. He is working on permit renewals for the Franklin STP and some of the other dischargers to the Harpeth River. Gary was asking for opinions regarding the article and how it might relate to the Harpeth Low DO TMDL that was approved by EPA in 2004. As you know, AquAeTer has had some involvement with water quality issues in the Harpeth River Watershed in the past.

Bruce

Comments on AquAeTer paper:

1. I agree with the statement " Many modelers with poor understanding of river kinetics use the sediment oxygen demand (SOD) rate to adjust for this inaccuracy and thereby produce a model that is not predictive or accurate and must be recalibrated to accommodate differing conditions." The inaccuracy, however, is mostly not caused by using an underestimated CBOD decay rate as suggested by the author. In model calibration, the laboratory bottle deoxygenation rate is normally treated as a reference. Instead, decay rates for dissolved and particulate organics based on published studies (typically ranging from 0.2 to 0.4 depending on the characteristics of the effluent) are employed. Adjustments on these decay rates are then performed (as part of model calibration) if field data are available. The inaccuracy is mostly the result of poorly calibrated algal activities (photosynthesis, respiration, mortality, etc.)
2. Comparing laboratory bottle deoxygenation rate with in-situ measurement in river is like comparing an apple with an orange. The bottle deoxygenation rate is measured under a controlled environment. The in-situ river DO consumption rate, on the other hand, is subjected to various factors such as partial mixing of the effluent, diurnal meteorology, additional bacteria seeding, algal activities, SOD, etc. Essentially, the comparison is meaningless beyond the first couple days.
3. Effluent CBODu can only be determined by the laboratory bottle test. For the same reasons described above, it will be very difficult, if not impossible, to measure the effluent CBODu (labile or recalcitrant) in river.

CITY OF FRANKLIN
DEPARTMENT OF FINANCE AND ADMINISTRATION
109 THIRD AVENUE SOUTH, SUITE 111
FRANKLIN, TENNESSEE 37064-2518
PHONE (615) 791-1457
FAX (615) 550-1955

MEMORANDUM

TO: Mr. Gary Davis, TDEC
FROM: Russell Truell, ACA Finance & Administration
DATE: March 19, 2007
RE: Comment on Public Hearing 2007-005

As a follow up to the public hearing held in Franklin regarding the City's application for to increase withdrawal of water from the Harpeth River, I request that this comment be added to the official record.

During the public hearing, I heard several comments concerning the validity of cost estimates set forth by the City's consultant, Mr. Scott Woodard. I would like to add to the record the fact that I, as Chief Financial Officer of the City, have reviewed the spreadsheet models that were presented by Mr. Woodard and found the production cost estimates to be accurate and the growth and withdrawal assumptions to be quite reasonable, even conservative.

In prior calculations, the Finance staff of the City determined that the fully loaded cost per gallon of water withdrawn from the river to be approximately half the cost of water purchased from Harpeth Valley Utility District. Even with the added capital costs of an expanded and modernized plant, there remains a substantial differential between the "landed" costs per gallon.

While I am not in a position to address any engineering questions regarding the application, it is clear to me as a financial officer that the rate payers of the City of Franklin Water system would receive a substantial financial benefit from the added capacity.

As CFO, I am also obligated to analyze the City's exposure to risk from a variety of circumstances, both natural and financial. From a risk management point of view, the redundancy offered by an optimally-sized and efficient water production system is a clear advantage to City residents in the event of acts of terror or destructive acts of nature. Since the City pays interest on infrastructure improvements based on its bond rating, and since bond rating agencies take into account the financial burden of utility costs and the risk reduction strategies of management in determining municipal bond ratings, there is a clear connection between emergency planning, redundancy and costs and the amount that taxpayers are required to pay for debt service on infrastructure.

Both personally and in my official capacity, I encourage approval of the City's withdrawal permit application.

Lynwood Meeting
10/9/06

Mike Corn - made presentation on Harpeth River
- Franklin withdrawal at 89.2

EPA Call 10/10/06

Proposed water withdrawal at Franklin (new withdrawal will replace old withdrawal)

Scott Woodard - Consultant for withdrawal

Mike Corn - Aquatier - Consultant for HRWA
want EPA to remodel river

EPA - says that if D.O. above discharge is below 5.0, then how can model make sense?

Withdrawal Conditions - Stream Flow = 6.0 msd - withdraw up to 1.0MGD
Stream Flow = 10.0 msd - withdraw up to 2.0MGD

TWRA - Tim Elkins

$y = L_a(1 - e^{-K_1 t})$

y = BOD(1,2,3,4,5, etc) mg/l

L_a = ultimate BOD, mg/l

K_1 = deoxygenation constant, day^{-1}

t = time in days

Solve for L_a based on y_5 and K_1 from EPA

then:

Solve for y at various times

then:

solve for remaining BOD, $L_a - y$ at each time

WATER MANAGEMENT DEPARTMENT

Mark S. Hilty, P.E.
Director

John C. Schroer
Mayor of Franklin

Eric S. Stuckey
City Administrator

1799

HISTORIC
FRANKLIN
TENNESSEE

November 30, 2009

Mr. Gary Davis
TN Dept of Environment and Conservation
Division of Water Pollution Control
401 Church Street
L & C Annex, 6th Floor
Nashville, TN 37243

RE: **DRAFT NPDES PERMIT NO. TN0028827**
Franklin Sewage Treatment Plant

Dear Mr. Davis:

We are writing as a follow up to our letter of September 23, 2009 requesting an extension until December 1, 2009 for submittal of comments on our draft permit. Attached are our comments, questions and objections to the referred permit. We are hopeful that you will be able to incorporate our proposed revisions or modifications to the draft permit. Once you have had a chance to review and provide your response to our comments, we will be happy to meet with you to try and resolve any continued objections.

Several of the draft permit conditions make reference to the September 2004 Organic Enrichment/ Low Dissolved Oxygen, TMDL study developed by EPA. Franklin has made repeated objections to these findings and has submitted comments indicating our objections. We continue to note our objections and disagree with the findings and the use of these findings for developing the proposed permit limits. In addition to our previously submitted comments, we feel the recent developments concerning pollutants from the Egyptian Lacquer plant and the resulting low dissolved oxygen in Liberty Creek at the Harpeth River in that vicinity may play an important role in understanding the underlying causes of dissolved oxygen levels in the Harpeth River.

The City of Franklin has recently entered into a contract with CDM to provide an Integrated Water Management Plan (IWMP). We anticipate this to be a very detailed and extensive plan, and we will gather input from a variety of stakeholders. Several of the proposed permit provisions will be identified and more fully developed and addressed during the IWMP process. The City of Franklin will spend hundreds of thousands of dollars on the IWMP. We are confident that the results of this plan will greatly improve the water quality within the Harpeth River. Many of our comments to the permit refer to Franklin's proactive approach in developing the IWMP.

Sincerely,

Mark Hilty

Mark Hilty, P.E.
Director, Water Management Department

Attachment

FRANKLIN SEWAGE TREATMENT PLANT
DRAFT NPDES PERMIT NO. TN0028827
Review Comments

The following comments, questions, and objections are hereby submitted on the referenced draft NPDES permit.

1. Permit Cover Sheet: The proposed time period for the new permit is approximately two years. We request that the permit expiration date be extended to a minimum of three years, with a preference of five years.

2. Section 1.1 – Numerical and Narrative Effluent Limitations: The rationale and justification for the addition of CBODu is unclear. The permit rationale (R 7.2) indicated the 2004 TDML (should be TMDL) used a relatively high treated effluent ultimate BOD for its modeling. It is assumed using the high ultimate CBOD is a more conservative approach to protect the water quality within the receiving stream. While it may be to Franklin's advantage to provide additional monitoring of ultimate CBOD in the receiving stream, we do not believe the cost and variability in this testing procedure is warranted. We may determine that ultimate CBOD analysis may be necessary during the evaluation of the alternatives within our IWMP. However, at this time, we do not believe there is justification for this requirement and request that it be removed from the permit.

3. Section 1.1 – Numerical and Narrative Effluent Limitations - Total Nitrogen: The monthly average amount and pounds per day for total nitrogen is 377 pounds during the summer period, however, there is a subnote that requires the total nitrogen average permit limit be less than 290 pounds per day. We request that this annual total nitrogen permit limit of 290 pounds per day be removed from the permit at this time. We recognize the need to have a TMDL driven mass limit within our permit. However, we believe this can be deferred until the IWMP and our Nutrient Management Plan have been developed and implemented. We request inclusion of the 377 pounds per day limit only.

4. Section 1.1 – Numerical and Narrative Effluent Limitations – Total Phosphorous Summer Period: The proposed permit requires a 3 mg/L monthly average concentration for total phosphorous. Rationale noted in Section R 7.5 notes that the Division considers that the permittee has demonstrated its ability to technically achieve the monthly average treated effluent total phosphorous of 3 mg/L for the summer months due to the plant's ability to meet this limit as noted on the permittee's DMR data. While the plant consistently achieved a total

phosphorous level of less than 3 mg/L, there have been several occurrences during the summer months that would have resulted in violation of this permit. Since there is no technical data to support a 3.0 mg/L limit other than past performance of the plant, we propose that the limit be set at 5 milligrams per liter. We would propose that one of the targeted goals to be included in the Nutrient Management Plan and the IWMP is to achieve a total phosphorous concentration of not more than 3 mg/L. Consequently, we propose this limit be raised to 5.0 milligrams per liter.

5. Section 1.1 – Numerical and Narrative Effluent Limitations – Copper and Silver: The proposed permit includes daily maximum levels of 0.075 and 0.10 for copper and silver respectively. The proposed effluent limits do not indicate what the units are for these parameters. We have assumed that they are milligrams per liter. The rationale for the total copper and silver limits is shown in R 7.6 and R 7.12. The proposed limits are apparently based on the Division's reasonable potential water quality evaluation. It is noted, however, that R 7.12 of the rationale states that the summary of the Semi-Annual Report data does not indicate that the potential exists for water quality criteria for any of the metals in toxic consideration to be exceeded. Therefore, we are unclear as to what the rationale would be for adding these metal limits to the new permit. We request that the total copper and silver limits be removed from the draft permit.

   We also request that the pass-through limits we received on September 21, 2009, from Ms. Jennifer Dodd be reviewed and compared to the worksheets shown in the draft permit. There are a few inconsistencies between the pass-through limits as contained in the September 21st letter and the information shown on page R-34 of 37 in the draft permit. In addition, we are confused between the information shown on page R-34 and R-37 of the draft permit. Both of these appear to be pass-through calculations. However, the information shown on R-37 had some slight differences from the information contained on R-34. We request that you review this information and provide better clarity on the proposed pass-through limits and the information shown on pages R-34 and R-37.

6. Section 1.1 – Numerical and Narrative Effluent Limitations: Over the past several years, the City of Franklin has expanded its reclaimed water system. The City has continued to keep TDEC involved of these efforts and Franklin has been a leader within the state of Tennessee in the development and regulation of reclaimed water systems. We are convinced that the Harpeth River Watershed has benefited from our proactive approach to the use of reclaimed water. The

Franklin Reclaimed Water System has expanded to include reuse by industrial customers, commercial developments, golf courses, recreational areas, residential developments both individual properties and common areas within these developments, and other non-potable uses.

We are in agreement with the limitations proposed and most of the narrative limitations proposed in Section 3.9. We are, however, concerned with the addition of the narrative requirements that application rates shall be restricted, such that nitrogen uptake by the receiving crop cover is sufficient during all months of the year to prevent the reuse water from causing the ground water underlying the application sites to exceed State groundwater criteria for nitrates. We believe this new requirement is unnecessary and excessive. The numerical limits in our permit are very restrictive and limit the nitrogen that can be contained in our reclaimed water. In addition, there are dozens of sites with a variety of cover crops where the reclaimed water is presently utilized. With the continued development of the reclaimed distribution system, we fully expect that the number of sites could increase drastically during the next dry weather period. The vast majority of these locations are turf grass-type cover crops and the application rates are limited to only that amount that is required for adequate irrigation of the turf grasses. Consequently, we request that the narrative limitation related to the application rates be removed from this permit.

7. Section 1.1 – Numerical and Narrative Effluent Limitations Suspended Solids Summer Period: The proposed monthly average concentration limits for suspended solids is 30 milligrams per liter. As noted in the rationale in 7.3, water quality regulations require a 30 milligram per liter TSS limit. The Division has proposed to reduce this limit to 10 milligrams per liter for the summer period. There is no basis for this permit limit reduction nor does the water quality criteria and regulations for the state of Tennessee require the reduction to 10 mg/L. As noted, Franklin Wastewater Treatment Plant does have advanced filtration for the removal of suspended solids from the effluent. This in itself is not sufficient justification in our opinion for the suspended solids limits to be decreased from its current value. We request the total suspended solids limit be maintained at 30 milligrams per liter. It is noted, however, in order to comply with other permit conditions, the City of Franklin will have to maintain its advanced filtration process to achieve other permit limits and will achieve total suspended solids limit less than 30 milligrams per liter.

8. Section 3.7 – Receiving Stream Monitoring/Reporting: The proposed permit adds additional receiving stream monitoring or reporting requirements.

Specifically, the permit requires supplemental in-stream monitoring and diurnal investigations at various locations within the receiving stream. The receiving stream investigations are described in Attachment 1 of the draft permit. As we have previously indicated, the City of Franklin is in the very early stages of an IWMP. This investigation will take several years to complete and we believe will have a positive impact on the watershed in the Franklin area. Inasmuch as the City of Franklin had previously initiated the IWMP without a requirement or mandate from TDEC, we request greater flexibility in the additional in-stream monitoring and the requirements of identifying and implementing advanced methods of improving receiving stream water quality as defined in the permit.

Attached to our comments is the detailed Scope of Work, Work Flow and Schedule for the first phase of the IWMP. We request that the provisions contained in Attachment 1 of the draft permit, particularly those related to the diurnal investigations and the implementation of advanced methods for improving receiving stream water quality be deleted from the draft permit and replaced with conditions and requirements that match those identified in our scope of work Attachment. Franklin is very committed to the development of the IWMP and believes this is a much better and more cost-effective approach to improving the water quality of our watershed, and we suggest that our proposed IWMP Work Plan be referenced in the draft permit as opposed to the language proposed by the Division in Attachment 1.

9. Section 3.8 – Nutrient Management Plan/Reporting: The proposed permit requires the development of a Nutrient Management Plan (NMP) as described in Attachment 2. The City of Franklin is continually looking for enhancements to help control the effluent discharge from the treatment plant. Various operational enhancements and changes and other alternatives continue to be evaluated for the most cost-effective solution to help achieve a very high quality effluent. We request that the Nutrient Management Plan, as presented in Attachment 2 be deferred in this draft permit, and we will incorporate some of the provisions included in the Division's Attachment 2 into our IWMP. We believe it is important for the goals for the watershed to be established by the stakeholders and that any water quality improvement plan that will be developed by the City of Franklin should incorporate those goals, along with the suggestions included in Attachment 2. We request that the Nutrient Management Plan, as proposed in Attachment 2, be incorporated into our future phases of the IWMP and be removed from the permit at this time.

SCOPE OF WORK, SCHEDULE, AND COST PROPOSAL
Integrated Water Resources Plan, Franklin TN

Prepared by CDM, September 2009

This scope of work, illustrated in **Figure 1**, outlines two major Phases during which a comprehensive, implementable, and fundable Integrated Water Resources Plan (IWRP) will be developed with the City of Franklin, focusing on stakeholder-derived objectives as the central measure of success. This approach will progressively screen alternatives in a way that is technically robust and broadly acceptable to the City, the regulatory community, advocacy groups, and citizens. The general approach of stakeholder integration and integrated analysis of alternatives for capital improvements and resource management opportunities across the spectrum of water-related utilities has been successfully applied in numerous communities and cities across the United States. The two phases are briefly described below, and broken down by tasks in the pages that follow.

- **PHASE I: Preferred Alternatives:** Phase I, which is expected to take 9 to 12 months, will include a series of stakeholder workshops and public forums to outline overall objectives for the City and its environmental resources; a proposed project schedule is provided in **Table 1.** These objectives will guide the formulation of alternatives for capital improvements (such as plant improvements) and resource management opportunities (such as water conservation, water recycling, *etc.*). An integrated model will be used that will simulate alternatives in all of the utilities and provide output to stakeholders and decision makers in the context of their own stated objectives. The process will screen the available alternatives down to those that are most broadly acceptable, and is expected to yield 3 to 4 preferred plans, which are defined as groups of projects or programs centered on specific themes (such as the lowest cost, the greatest improvement to the river, *etc.*). Phase I will also yield preliminary cost estimates for the alternatives, as well as professional assessments on likely permitting and environmental issues. At this point, only Phase I is scoped in detail and budgeted, since the work beyond the identification of the preferred alternatives depends very much on the nature of the alternatives that are to be carried forward into Phase II.

- **PHASE II: Finalization of an Integrated Water Resources Plan:** Phase II is expected to take 12 to 15 months to complete, the schedule will depend upon the outcome of Phase I but at a minimum, will include the following analyses:
  - Detailed technical analysis of the preferred alternatives,
  - Continued modeling and screening of the plans to compare and rank them with stakeholder input,
  - Identification of a single preferred plan (the IWRP) from among the alternatives (or by creating a blend of the preferred alternatives),
  - Conceptual design of identified projects (siting, sizing, performance needs, *etc.*),
  - Permitting assistance for identified projects,
  - Detailed cost analysis, and
  - Financing plan for the implementation of the IWRP

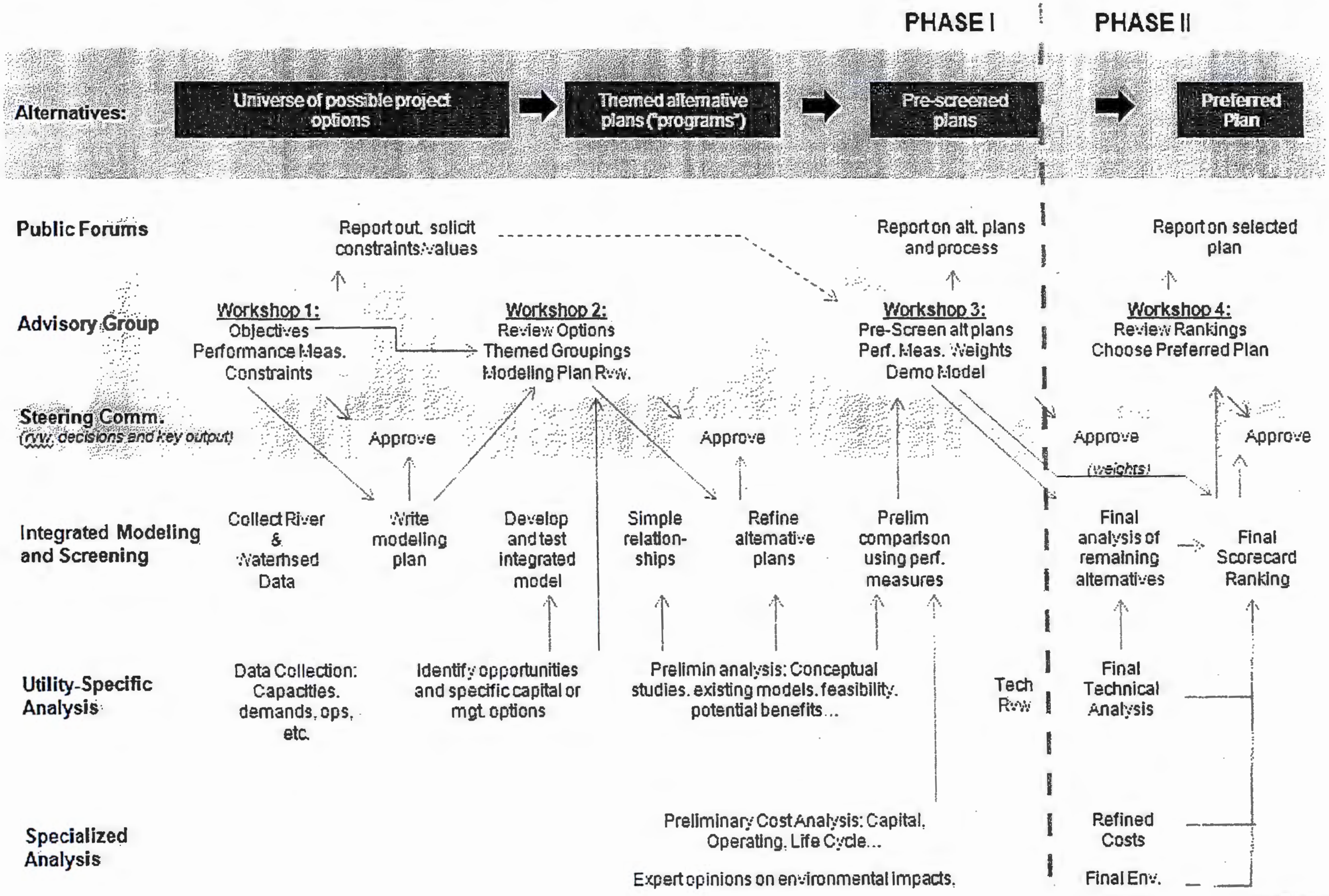


Figure 1
Illustrated Work Plan
Franklin Integrated Water Resources Plan

Table 1
Proposed Project Schedule for Phase I
of the Franklin Integrated Water Resources Plan

		Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
Task 1: Stakeholder and Public Involvement													
1.1	Kickoff Meeting with Client												
1.2	Introductory Stakeholders Meeting												
1.3	WS 1: Objectives, Measures, and Constraints												
1.4	WS 2: Initial Formulation of Alternatives												
1.5	WS 3: Identification of Preferred Alternatives												
1.6	Public Forums												
1.7	Technical Modeling Meeting												
Task2: Integrated Modeling													
2.1	River/Watershed Data												
2.2	Simplified Relationships												
2.3	Modeling Plan												
2.4	Model Development/Testing												
2.5	Preliminary Alternatives Analysis												
2.6	Scorecard Tool												
Task 3: Technical Analysis of Infrastructure and Resource Management Options													
3.1	Water Supply												
3.2	Stormwater												
3.3	Wastewater												
3.4	Reclaimed Water												
3.5	Environmental/Permitting Issues												
3.6	Preliminary Cost Analysis												
Task 4: Quality Assurance and Deliverables													
4.1	Technical Review Meeting												
4.2	Phase I Report												

PHASE I

Task 1 - Stakeholder and Public Involvement

CDM will facilitate engagement of stakeholders from the beginning and throughout the entire planning process, which will help define the objectives of the plan, identify potential solutions, collaborate on the formulation of analysis tools, and providing recommendations for the Board of Mayor and Aldermen (BOMA). CDM has assumed a baseline number of meetings, around which our project costs have been formulated. Based on our experience with similar projects, each of the following workshops and meetings has been scheduled for four hours. However, we recognize that additional meetings with all subsets of stakeholders may be required and the cost of those meetings has been provided separately. These meetings may consist of one of three types and could include stakeholder workshops, technical review meetings, or information update/report-out meetings.

Task 1.1 - Kickoff Meeting with Client

The kickoff meeting with the client will follow CDMs matrix analysis approach to project planning that involves the entire team on the project's objectives. During this facilitated meeting, team members will agree on the factors that are necessary for the project to succeed and they take responsibility for implementing an action plan to meet project goals. This meeting will also be used to identify participants for the following stakeholder groups:

- **Steering Committee:**
  - Work with consultant to direct the process
  - Recommend BOMA approval of decisions and deliverables
  - Recommend policy decisions on service areas (WW / Reuse)
- **Stakeholder Advisory Group:**
  - Participates in workshops
  - Makes decisions subject to approval by Steering Committee
  - Likely to include City officials, watershed organizations, utility directors, state regulatory representatives, public representatives, USGS, technical reviewers, City task force representatives, others.
- **Public Citizens**
  - Receive reports on project progress
  - Provide ideas, information, values to Advisory Group

Task 1.2 - Introductory Stakeholders Meeting

CDM will facilitate a meeting with the Steering Committee, Stakeholder Advisory Group, and any members of BOMA who desire to participate. During this meeting, we will outline the approach and timeline for Phase I, define the roles of the stakeholders and explain the first need for information from the stakeholders, which will be discussed in the subsequent workshop: Objectives, Performance Measures, and Constraints.

Task 1.3 - Workshop 1: Objectives, Performance Measures, and Constraints

The first workshop will be used to develop consensus identification of the following three guiding sets of information:

- Objectives: These will represent the consensus voice of the stakeholders from beginning to end of this project. All subsequent analysis and comparisons will be linked to these objectives so that decisions can be made around agreeable goals for Franklin. Examples of project objectives might include lowest cost, improve conditions of the Harpeth River, increase efficiency of resource utilization, *etc.* Ideally, we will work with the stakeholders to identify commonality or redundancy in voiced objectives, and produce a list of approximately 5 – 8 governing objectives.

- Performance Measures: Performance measures are quantifiable (or qualifiable on a relative scale) characteristics of alternatives that can be compared in direct relation to the project objectives. Examples of performance measures might include low flow frequency in the Harpeth River, life-cycle cost, likelihood of permitting hurdles, environmental impacts, *etc.*
- Constraints: Constraints help bound the problem, and avoid consuming unnecessary time analyzing or debating alternatives that are physically, economically, environmentally, or even politically infeasible.

Task 1.4 - Workshop 2: Initial Formulation of Alternatives

CDM will facilitate a workshop to present, and modify as necessary, a list of specific project or resource management opportunities for stormwater, water supply, wastewater, and water reuse in Franklin. CDM will facilitate discussions on the possible groupings of alternatives and how these groups of alternatives could be integrated. Ideally, each individual grouping will be centered on a theme that is linked to one of the objectives – for example, we may work with the stakeholders on developing a "low cost" grouping, a grouping that is most beneficial to the river, *etc.* These can later be compared and blended as the project and screening process progress.

Following this workshop, the preliminary list of alternatives from Phase 1 will be finalized and CDM will assume that 8 to 10 alternative project groupings ("alternative plans") will be identified for further screening and analysis. These alternatives can include a combination of infrastructure projects, institutional controls, conservation programs, public education campaigns, *etc.*

Task 1.5 - Workshop 3: Identification of Preferred Alternatives

During this final workshop in Phase I, the alternatives will be evaluated using a scorecard approach. Stakeholders will have been asked to assign weights to the performance measures developed in Workshop 1 (either as individuals, or as organizations as fairness warrants). Results of technical analysis, preliminary cost and environmental analysis, and integrated modeling will be used to populate a matrix of the alternatives and the performance measures. The outcome of this meeting will be a preferred set of 3 to 4 alternatives that most broadly support the stakeholders' collective objectives, and which will be further developed and analyzed in Phase II. At the end of this phase, the analysis will be conceptual, aimed at distinguishing key performance characteristics of the alternative plans. Phase II will refine the analysis, but because of the screening process in Phase I, will be able to effectively focus on those alternatives which offer the most promise.

Task 1.6 - Public Forums

The CDM project team will coordinate two public forums during which information will be provided to the general public regarding the project objectives and alternatives arising from the selection process. The focus of these meetings will be on educating the community and providing the general public an opportunity to provide feedback to the consulting team and the stakeholder advisory group.

Task 1.7 - Technical Modeling Meeting

CDM will host a meeting for interested parties to review the technical formulation and functionality of the integrated model (developed under Task 2). During this meeting, technical specialists will be available to provide detailed information regarding the model assumptions, construction and integrations of model relationships and the overall process of running the model.

Task 1.8 – Additional Meetings

As noted in the general discussion of Task 1, additional meetings may be necessary to fully engage stakeholders throughout the entire planning process, fully describe the formulation and use of technical analysis tools, and satisfy communication needs for BOMA and the public. These meetings may consist of one of three types and could include stakeholder workshops, technical review meetings, or information update/report-out meetings. The costs of these additional meetings, meeting preparation and other direct costs are provided in **Table 2,** along with a brief description of the CDM team staff attending and the goals of the meeting type.

Table 2
Cost and Scope of Additional Meetings
for Phase I of the Franklin Integrated Water Resources Plan

Meeting Type	Key Staff	Goals	Cost
Stakeholder Workshop	Facilitator, Task Manager, Project Coordinator, Engineer, Senior Technical Specialist	Engage stakeholders for additional feedback/buy-in	[redacted]
Technical Review Meeting	Task Manager, Project Coordinator, Engineer, Senior Technical Specialist	Provide specific technical details with regard to model assumptions/ analysis/results	[redacted]
Information Update	Task Manager, Project Coordinator, Engineer	Disseminate project information	[redacted]

Task 2 - Integrated Modeling

This task includes the development and application of an integrated computer modeling tool that will simulate the behavior and interactions of the Harpeth River, water supply, wastewater, stormwater, and water reuse programs in Franklin. It will integrate utility-specific technical information into a platform that can compare and contrast the benefits and shortcomings of alternative IWRP formulations. The model will be developed with software such as Microsoft EXCEL, STELLA, or an equivalent platform that allows dynamic simulation of integrated systems over extended time periods. The model will account for future demands, historical hydrology, and the dynamics of existing and planned infrastructure in the Franklin study area. Most importantly, it will represent all of the water-related utilities, the river, *and their interdependencies* in a single platform in a way that will allow simple evaluation and comparison of integrated plans. It is the interdependencies of utilities, the river, and the watershed that warrants the formulation of integrated plans, and the model will be one of the means to this end.

Task 2.1 - River/Watershed Data

It is assumed that one of the central focal points of the project is the Harpeth River. Therefore, this task involves collection and aggregation of river data and is developed based on assumptions regarding the availability, comprehensiveness, suitability and quality of existing data. At a minimum, the following datasets are assumed to be available to the project team. As needed, data and information collected during this task will help CDM and stakeholders better understand the dynamics of the Harpeth River, and will be incorporated into the integrated model developed under other following subtasks.

- Reports and studies on the Harpeth River hydrology, management and regulations, past infrastructure designs, biology and ecology, and population growth patterns
- Watershed land uses, area, soils, slope
- Geographic build-out limits for service area
- Precipitation records
- Historical evaporation rates

- Hydrologic flow records and relevant statistics (USGS and/or TVA daily time series, monthly average and median flows, 7Q10, *etc.*)
- Information on rainfall-runoff relationships
- Hydraulic travel times and residence times in any impounded areas downstream of Franklin
- Intake elevations at supply locations
- Low flow requirements, including ecological flow targets throughout watershed and their rationale (aquatic species and habitat requirements)
- Demand projections for relevant river withdrawals, including seasonal variability
- In-Stream Hydrologic Alteration Model and supporting data, used to develop withdrawal ARAP
- TMDL studies
- Existing and proposed NPDES permits
- HRWA studies, reports and supporting data
- Designated river uses, restrictions and 303d status
- Upstream withdrawals and downstream rights or permits
- Water quality on nutrients, DO, bacteria, chlorophyll, TSS, *etc.*
- Water quality issues affecting chemical treatability for drinking water which may include metals, toxics, *etc.*
- Historical discharge rates and concentrations

Task 2.2 – Simplified Relationships
The data collected above will be used to develop generalized relationships suitable for a conceptual representation of the Harpeth River in the Integrated Model. Unlike high-resolution multidimensional models that are specific to water quality, hydrology, or hydraulics, and which take a long time to develop and run, the Integrated Model is intended to capture the fundamental dynamics of the river at a level that allows the discernment of plans that are beneficial from those with limited benefits or detrimental impacts. It is envisioned that, based on the data collected in Task 2.1, simplified relationships for rainfall-runoff, travel times, pollutant loading, and dilution will be developed and included in the conceptual integrated model.

Task 2.3 - Modeling Plan
CDM will draft a modeling plan memorandum. This document will revolve around the project objectives and performance measures as defined by the stakeholders in the workshops in Task 1. At a minimum, the modeling plan will include:

- Software selection
- Necessary resolution
- Planning horizon (into the future)
- Historical record (for climate and hydrology data)
- Resolution for the representation of each utility and its dynamics (demands, loads, peaking, *etc.*)
- Model input
- Model output
- Scenario definition and flexibility of formulation
- Techniques for uncertainty and sensitivity analysis (forms of "risk"), if desired
- Formulation plan for addressing each of the stakeholders' identified performance measures

Task 2.4 - Model Development/Testing
CDM will develop a conceptual dynamic model of the Harpeth River and Franklin's water-related utilities. At a conceptual level (sufficient for distinguishing benefits and disadvantages of alternative integrated plans), it will include the river hydrology, basic water quality relationships, the utilities which will be addressed by this IWRP, demands, in-stream flow requirements, assimilative capacities, operating costs, *etc.* The model will include representation of existing infrastructure and facilities, as well as options for including possible new infrastructure in the future (as part of integrated plans). It will therefore be capable of simulating the alternative plans, their impacts, and their potential benefits.

The first step will be to draw a representation of the system, including the interdependencies between the river, the watershed, and the utilities. This will serve two purposes: it will help people understand the interconnectivity of the various resources and facilities, and will also serve as the functional outline of the model. Next, available data and simplified mathematical relationships will be entered, both from Task 2.1 and from Task 3 (utility-specific information). The model will be tested for accuracy of the water balance, load balances, operational representation, and river representation. Comparative scenarios will be run and results will be compared to published data, as available.

Task 2.5 – Preliminary Alternatives Analysis
The completed, integrated model will be used to test and compare alternative plans as formulated by the stakeholders and CDM team. It will also be used to refine and adapt these plans based on results. Preliminary results will be provided to stakeholders in the form of scorecard analysis in Workshop 3. At this point, the model may also help identify specific project options, or even complete alternatives (groups of projects) that are impractical or which have very limited benefits. In such cases, the stakeholders may agree to not carry such alternatives forward for further analysis. As defined in the modeling plan, the model may also be used to address questions of uncertainty in hydrologic or performance data, as well as the sensitivity of solutions to changes in capacities or operating requirements. Ultimately, the purpose of the integrated model in Phase I is to simulate and refine alternative plans, and use results to identify a smaller set of most preferred plans to carry forward to Phase II.

Task 2.6 – Scorecard Tool
In order to provide a comprehensive and consistent basis for comparing alternatives, CDM will apply a tool for organizing interdisciplinary information, incorporating stakeholder values (e.g. "which is more important, cost or river flow?"), and comparing each alternative to all the others using common performance measures. CDM routinely uses Criterion Decision Plus (CDP) or EVAMIX (a spreadsheet program) to help rank alternatives in integrated water resource plans. These tools can mix quantitative and qualitative data in a single matrix, are easy to use, and provide a transparent and reproducible evaluation process that lends itself to stakeholder participation. It will be populated with performance measures that come out of the integrated model (Tasks 2.4 and 2.5) as well as the utility-specific analysis in Task 3. The scorecard tool will be used before and/or during Workshop 3 to rank the alternative plans. The tool will illuminate areas of consensus among stakeholders, the ways in which the stakeholders' values have influenced the rankings, and the principal similarities and differences between the alternatives. This type of transparent illustration of results is extremely important in building consensus. The task will include the structuring of the tool and collaboration with project team experts in establishing qualitative scores for performance measures that cannot necessarily be quantified (for example, "poor-fair-good-best")

Task 3 - Technical Analysis of Infrastructure and Resource Management Options

During this task, the project team will review existing studies, reports and plans that have been developed for each utility. The project team has assumed that these existing documents have identified a set of project options on a utility specific basis and that there is a basis established for conceptual capital and O&M costs developed for project alternatives. These projects, in addition to other previously unidentified projects that might arise when system integration is considered, will subsequently become building blocks for the development of themed alternatives in the integrated resources plan. The effects of these options will be simplified for analysis in the integrated model, (e.g., an increased water withdrawal could result in a decreased downstream wastewater assimilation capacity). Additionally, for this task, the project team will document the permitting requirements necessary for each of the alternatives to be evaluated in this task. The output of the following subtasks will be:

- Options for projects or operations of each utility previously identified
- Options for projects or operations of each utility NOT previously identified (these may be entirely new as developed by project experts, or may be adaptations of previously identified options to better address integration needs)
- Preliminary cost estimates for project options (capital and operating costs, on unit bases)
- Permitting requirements for each project option
- Simplified way(s) to represent the influence of each project option on other utilities and the river

Task 3.1 - Water Supply

Existing reports and modeling that have been developed for the City's water supply system, including the water treatment plant and distribution system will be reviewed. There has been a significant effort on developing the basis for additional withdrawal from the Harpeth River and water treatment plant infrastructure improvement. It is assumed that data from these previous projects are comprehensive and can be used to develop a complete list of water supply projects and options for consideration in the integrated model. From this review, a technical memorandum will be prepared which will include a compilation of specific information with respect to water treatment plant capacities (both hydraulic and treatment), distribution system capacity, demand projections, existing project drawings, *etc.*

Task 3.2 – Stormwater

Basin water quantity master plans and stormwater models based on the master plans have previously been developed for the City of Franklin by CDM. CDM was also involved in the development of Franklin's stormwater utility and stormwater management manual and regulations. These existing studies will be reviewed. Because CDM has been integrally involved with these stormwater planning efforts, the applicability of information from these previous projects is known and the level of effort needed to develop a complete list of stormwater supply projects for consideration in the integrated model is well understood. While the stormwater master plans have been completed, it has been a number of years since this work has been done and some level of effort is required to review changes to the system and identify opportunities for future beneficial initiatives. In addition, these stormwater models were developed to specifically evaluate stormwater quantity and additional investigations may be needed to look at stormwater quality. From this review, a technical memorandum will be prepared which will include a compilation of specific information with respect to the applicability of the existing models and basin plans, infrastructure changes that have occurred since completion of previous studies and the status of the MS4 permit and institutional controls for the stormwater system that provide opportunities for developing project alternatives.

Task 3.3 - Wastewater
While CDM has previously assisted the City of Franklin with work at the existing wastewater treatment plant, it has been a number of years since the Value Engineering Report for the last wastewater treatment plant expansion was completed. The wastewater treatment plant and collection system is the utility for which the least recent information is currently available. During this phase, analysis will be required to develop a complete list of alternative projects and associated costs to be considered in the integrated model. From this review, a technical memorandum will be prepared which will include a compilation of specific information with respect to the wastewater treatment system capacities, including both hydraulic and treatment, demand projections, collection system and I/I information, existing project drawings, *etc.*

Task 3.4 - Reclaimed Water
Existing reports and studies that have been developed for the City's reuse system will be reviewed. SSR has made significant progress in identifying both the institutional and infrastructure requirements for expanding the reuse system. It has been assumed that data from these previous projects are comprehensive and can be used to develop a complete list of reuse projects for consideration in the integrated model. From this review, a technical memorandum will be prepared which will include a compilation of specific information with respect to the existing models and basin plans, infrastructure changes that have occurred since completion of previous studies and the status of the institutional controls that could be used to develop options for the reclaimed water system.

Task 3.5 - Environmental/Permitting Issues
For this task, the project team will meet with the various state and federal agencies that may be required to review and approve permits for the various proposed projects. We will identify and document the permitting requirements necessary for each of the alternatives to be presented in the plan, and what types of studies, investigations or reports that may be needed to support the project permitting process. The project team will also use this information to establish a rating factor for the potential for successful permitting of each alternative for analysis in the model. From this review, a technical memorandum will be prepared which will include a compilation of the specific information needed to develop permits for proposed projects.

Task 3.6 - Preliminary Cost Analysis
Planning level project costs for comparative purposes during Task 3 will be developed or refined. For each alternative, capital and O&M costs will be estimated to facilitate the analysis and scoring of project alternatives that will be discussed in Workshop 3. Construction cost estimates will be developed using CDM's experience in design, bidding and construction of similar projects. Capital costs will be developed to include, in addition to construction costs, an allowance for engineering, legal, and administrative costs and services. Operation and maintenance costs will be estimated as present worth costs over the expected design life of the also will be considered as necessary. From this analysis, a technical memorandum will be prepared which will include a compilation of the planning level costs specific to each proposed project.

Task 4: Quality Assurance and Deliverables
At CDM, quality is defined as meeting or exceeding our client's requirements and objectives and those we set for ourselves. As a result, CDM has a formalized Quality Management Procedure which delineates the procedures we follow to meet our quality expectations. In accordance with CDMs quality policy, this task provides technical review prior to delivery of the Phase I Report.

Task 4.1 Technical Review Meeting
CDM will convene a technical review panel to review the results from Phase I, including review of assumptions, river dynamics, integrated modeling work, and the detailed characterization of specific project options, their costs, and their likely environmental issues.

Task 4.2 Phase I Report – Summary of Preferred Alternatives
Based on technical analysis, qualitative features of the alternatives, and preferences of the stakeholders, CDM will formulate a Draft Phase I Report describing the preferred alternatives and the stakeholder driven process used to derive them.

PHASE II

The final phase of this project is to identify a single preferred alternative as the Final Integrated Water Resources Plan. The final plan will include a detailed technical analysis of the preferred alternatives and a ranking tool to prioritize the alternatives for the stakeholders according to project specific objectives. This will include a workshop to review the alternatives ranking and recommend a plan. A plan for the recommended alternative will be developed, and will include conceptual engineering/design, cost estimating, permitting and planning, a funding plan, an implementation schedule and identification of critical path items, and continued stakeholder outreach necessary to ensure continued broad support during finalization of the plan. CDM will incorporate the results of both phases into a comprehensive Integrated Water Resources Plan which will present a precise summary of the Phase I and Phase II analyses, document the stakeholder involvement process, and present a detailed roadmap including scope, schedule and funding plan for the City of Franklin. The plan will present a long-term program to meet water resources needs for the next 20 years by identifying the alternatives, their recommended timing, effects, and estimated costs. The highest level of detail will be provided for near-term projects (5 to 10 year horizon), with the understanding that the plan should be periodically updated based on growth, water use and climate trends.

Task 1 - Refined Technical Analysis
As needed, CDM will refine the technical analysis of the component projects or opportunities within the preferred alternatives. This may include (for example) facilities modeling, collection system modeling, water quality modeling, hydraulic and performance calculations, *etc.* The work will support the continued integrated modeling (below) and will lead up to the conceptual design task.

Task 2 - Continued Integrated Modeling and Stakeholder Involvement
CDM will build upon the integrated modeling tool and scorecard tool developed in Phase I as information on the preferred alternatives is refined through detailed analysis (above). The scorecard tool will be updated with refined scores, and will be used at a 4th stakeholder workshop to help select the preferred plan. It is envisioned that this process may not necessarily require selecting from among the remaining alternatives, but that it may include combining the attractive features of the preferred alternatives into a final plan.

Task 3 - Conceptual Design and Cost Estimates to Develop a Selected Alternative
During Phase II, the list of preferred alternatives for long-term water supply solutions will have been developed, and presented to stakeholders for feedback. In order to advance the analysis to develop a final plan, planning-level estimates of the costs of those alternatives will be developed. The purpose of the design task under Phase III will be to advance the design of the selected alternative(s) so that a more accurate understanding of the project details will be available for developing the final plan, and specifically for estimating total project costs, scheduling, implementation issues and permitting requirements. Emphasis will be placed on projects recommended for near-term implementation. The level of detail for design will be dependent upon the alternatives selected, but at a minimum will include land/easement requirements, site planning and layout, identification and preliminary sizing of major mechanical or electrical systems, preliminary engineering of major structures, and geotechnical evaluation of sites/routes as needed.

Task 4 - Final Plan Development
Development of a final plan will incorporate the critical aspects of scheduling, permitting and funding in addition to the specific design aspects of the selected alternative. The following subtasks provide a general description of these key plan elements that will be provided along with the details of the project conceptual design.

Task 4.1 - Scheduling
One of the key aspects of water resources planning is the scheduling for major program elements. Under this task CDM will develop an integrated schedule listing the major components of each of the alternatives identifying when each phase of the alternative must be initiated and completed in order to have the infrastructure improvements in place in time to meet demands. CDM will develop the schedule with sufficient flexibility as future conditions change as a result of growth, system performance, system structural integrity, system maintenance needs, regulatory requirements, and other factors.

Task 4.2 - Permitting Plan
Our cost estimate for this task does not include the actual permitting as we cannot estimate the level of effort required for this process until the preferred alternative has been identified and preliminary design components are developed. Some alternatives may be scheduled several years into the planning period, and permitting will not be necessary until the alternatives are ready for implementation. CDM will develop a detailed plan for obtaining the permits for each of the selected alternatives, including initial coordination with all regulatory agencies, and present the estimated costs for obtaining the permits for the selected alternative upon adoption of the IWRP.

Task 4.3 - Funding Plan
Once a preferred alternative has been selected, CDM will collaborate with Jackson-Thornton to identify potential funding sources for the alternatives which may include appropriations such as the Water Resources Development Act, Special Appropriations or loans based on rate impacts analyses or other State financing programs. The results of the financial analysis will be summarized and a schedule for funding will be developed. The funding planning process will use information developed through the prior cost estimating and schedule development tasks. A cash flow needs assessment will be developed for the entire program and will include the total dollars needed and timing for major project expenditures. The CDM team will meet with the various funding agencies and determine the process, timing and key elements of the various grant/loan programs. Similar to the permitting process, an overall plan for program funding will be ready to implement upon adoption of the IWRP.

December 22, 2010

Mr. Gary Davis
Permit Section
Division of Water Pollution Control
410 Church Street
L & C Annex, 6th Floor
Nashville, TN 37243

RE: NPDES Permit No. 0028827, City of Franklin Pretreatment Program Reporting Requirement change from semiannual to annual reporting

Dear Mr. Davis:

The City of Franklin, TN Wastewater Treatment Plant NPDES Permit No. 002887, issued September 30, 2010, has a requirement in *Section 3.2 POTW Pretreatment Program General Provisions (d)* that the permittee shall provide a semiannual report. The semiannual reporting requirement is also mentioned in the *Rationale R7.17* section of the permit. The City of Franklin requests that the NPDES permit language be changed to annual reporting for the Pretreatment Program, based on previous approval by the State Pretreatment Coordinator.

On May 19, 2010 the City of Franklin submitted a request to the State Pretreatment Coordinator, Jennifer Dodd, to report annually to the Division's Pretreatment Section, as opposed to semiannual reporting that was required at that time. On May 21, 2010, a letter from the State Pretreatment Coordinator confirmed that the request for annual reporting was approved. A copy of the approval letter is enclosed.

If you have any questions, or need any additional information, please contact Mr. Vic Bates (Phone: 615-791-3207) or me.

Sincerely,

Byron Ross

Byron Ross
Monitoring & Management Services, LLC
City of Franklin, TN Contractor

WPC Permit Section
RECEIVED
DEC 22 2010
TN Division Of Water
Pollution Control

HARPETH RIVER
WATERSHED ASSOCIATION

September 20, 2006

James Fyke, Commissioner
TN Department of Environment and Conservation
401 Church Street
L & C Annex, 6th Floor
Nashville, TN 37243

Paul Sloan, Assistant Commissioner
TDEC
401 Church Street
L & C Annex, 6th Floor
Nashville, TN 37243

RE: Lynwood STP—Need to rescind letter by Water Pollution Control of August 15 that in effect issued a major permit modification by approving advanced tertiary treatment and more hook-ups without complying with state and federal public notice and public participation regulations ((NPDES permit No. TN0029718)

Dear Commissioner Fyke and Assistant Commissioner Sloan:

I would like to request your attention to efforts that began this spring by Lynwood Utility STP, which provides sewer to subdivisions in the Grassland community of Williamson County and discharges into the Harpeth river. The utility has been working to obtain approval from TDEC Water Pollution Control to hook-up a new subdivision of 350+ homes when the remaining capacity of the plant has been placed in reserve under their permit by TDEC for the Williamson County project to hook-up nearby subdivisions with failing septic systems. Twice TDEC Water Pollution Control has sent letters to Lynwood stating that the information provided was inadequate. However, August 15, the department issued a letter that accepted the utility's proposal to allow the hook ups for a maximum of 350 homes contingent upon funds from the developer of this subdivision paying $400,000 for several advanced tertiary treatment systems and to put another $150,000 in escrow for an activated carbon absorption system should TDEC require it in the future.

not true only 125,000 gpd

Below are several major concerns we have with the August 15 TDEC WPC letter:

not true

1) procedural problems that the TDEC WPC letter in effect approved a major permit modification without following the state or federal requirements,
2) significant substantive problems with the utility consultant's analysis, and

Consultant is a registered professional engineer that stands behind his findings

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3) recent EPA and TDEC field data regarding serious water quality standard violations during the summer in the Harpeth that also must be taken into account since the Harpeth is a water quality limited stream with set TMDL load limits established for each permitted discharger.

letter says this

<u>This issue needs your urgent attention because the developer's proposal, called Chalmer's Cove, is on the Williamson County Planning Commission agenda for **October 12**</u> and the TDEC letter of August 15 will be used to state that the development proposal has sewer when this is not the case. The TDEC letter needs to be rescinded before this date, and the legal procedural channels for a major permit modification followed by the utility if it is still appropriate after examining the material provided here. I truly appreciate your attention to this important issue since the timeliness of your response is crucial to local county planning processes as well. HRWA will work with TDEC to arrange a meeting that includes Williamson County representatives and their consultants on their Grassland septic hook-up project, Lynwood, HRWA and our experts, representatives of citizens who brought legal action to stop the significant water quality violations by this utility in recent years, and any others you suggest.

<u>A brief history of Lynwood:</u> The Lynnwood plant has had chronic problems with permit violations exceeding effluent limits that go back to 1995 at least. TDEC issued several Notice of Violations beginning in 1998 and noted a minimum of 50 violations between June 1999 – April 2002, including raw sewage overflows. The District Attorney filed a civil lawsuit against Lynwood for water quality violations and TDEC issued a moratorium on new hook-ups after learning during the 2002 permit renewal that the previous owners had not installed the required nitrogen removal equipment as part of the approval for the plant's capacity expansion to serve River Landing, Legends Ridge, and Chapelwood subdivisions. The court case that included a citizen suit was settled in June 2004 and involved paying court costs, $70,000 in penalties and $30,000 to the residents for damages. The current owners took over ownership at the time TDEC imposed the moratorium in the 2002 permit. The current owner installed the required equipment needed to lift the moratorium though they initially appealed the moratorium which effectively delayed the moratorium on hook-ups until 2003.

1. Proposal for advanced tertiary treatment and modifications to the permit regarding the reserve sewer capacity must follow state and federal rules for major permit modifications.

TDEC WPC August 15 letter agreed "to allow the addition of wastewater from a maximum of 350 homes in the proposed Chalmer's Cove subdivision contingent upon the follow commitments. These commitments are $400,000 from the developer to pay for "standby by electrical generators, coagulant chemical feed system, and two tertiary dual media filters." Also $150,000 from the developer will be set aside in an escrow account to provide "an activated carbon adsorption systems following the tertiary filters." These constitute an advanced tertiary treatment system which *are "material and substantial alterations or additions to the permitted facility"* under the Clean Water Act (40 CFR Part D § 122.62 (a)(1). In both the Clean Water Act (40 CFR §124) and TN's Water Quality Control Act (Chapter 1220-4-5-.06) public notice procedures are required for permit modifications unless they are minor as defined narrowly in the law to cover only typographical errors, to require more frequent monitoring or reporting, to change an interim compliance data, or to allow a change of ownership. The first attachment to this letter has the relevant sections of the Clean Water Act (40 CFR Part D §122.62-63) which are also found in the TWQCA Chapter 1220-4-5-.06(5)(b).

They require new proposal the facilities meet nits. it will not

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The public notice procedures for this major permit modification have not been followed. Thus, TDEC WPC August 15, 2006 letter needs to be rescinded and the public notice procedures initiated if warranted. Until that process is complete, there is not sewer availability for Chalmer's Cove at Lynwood. We recommend that a letter to such effect be written to the applicant and Williamson County by October 12 for the planning commission meeting. The following two sections focus on the merits and substance of analysis presented by Lynwood's consultant that would then be appropriately discussed during a major permit modification process.

not true

2. Lynwood's proposal essentially undermines Williamson County's Grassland Septic sewer project and violates the permit by essentially giving the sewer reserve in the permit for the county project to a proposed new subdivision. not true

As part of the plant permit expansion in 2002, a doubling of the plant's capacity to 400,000 gallons to enable the new subdivisions mentioned above, TDEC WPC placed 125,000 gallons of the new capacity in a sewer reserve in the permit specifically to serve nearby septic neighborhoods that have been experiencing failures. Williamson County is now underway with their Grassland Sewer Project to hook-up these neighborhoods that total about 450 homes. In our letter to Paul Davis of April 21, 2006 (attachment 2), HRWA provided a flow rate analysis on the existing and approved customers based on information from the county planning department to demonstrate that Lynwood had no more capacity beyond its current customers and the County Grassland Sewer project. One significant concern, then, is that approving a new 350 home subdivision essentially takes the current sewer reserve for the county project and gives it to a proposed new subdivision that the county has NOT approved to date for lack of sewer availability among other issues. Approving Lynwood's proposal then violates the permit's sewer capacity reserve section (Part III. G.) and would on its own merit constitute a proposed major permit modification.

3. Lynwood consultant's proposal and information to date does not comply with aspects of TDEC's required design criteria, with the existing permit, nor with and state and federal regulations.

This letter will touch on key points from the attached memo and engineering analysis done for HRWA by Aquaeter to review analysis done by the Lynwood consultant provided to TDEC to date (attachment 3). Aquaeter is an environmental engineering and science firm based in Brentwood and with offices in Colorado and Pennsylvania that helps their clients comply with federal, state and local regulations. A full page of their credentials is at the end of the Water Quality Analysis that we contracted Aquaeter to do for HRWA regarding the summer time water quality issues in the Harpeth. Some aspects of this study will be referred to later and it is Attachment 4.

Aquaeter goes into great detail to provide calculations on flow and mass loadings from the plant with 350 additional homes and the county sewer project, review the costs regarding the tertiary treatment options discussed, and review the DMRs as much as were available. TDEC's "Design Criteria for Sewage Works" require monitoring observations, test results, mass balances to each processing unit and the like that as far as we can tell from the files have not been provided to TDEC. (see page 2 of Attachment 3).

A critical issue has been the consultant's approach to take the average monthly flows from the plant over the past 1.5 years and working from an AVERAGE of those 18 or so months versus working from the MAXIMUM of the average monthly flow during that 1.5 year period. (Working off the last year or so makes sense for Lynwood because only recently have most of the homes in the newly built subdivisions come on line from when the plant was expanded.) As Aquaeter's memo discusses in great detail, sewage treatment plants are designed with the maximum monthly average flow (not the average of the monthly average flows) and with the maximum daily flow. According to Aquaeter's analysis, this affects everything from the cost of the proposed tertiary treatment to the most fundamental issue that the plant will fail because the consultant's calculations are not based on these two conditions—maximum monthly average flows and maximum daily flows. The actual numbers in terms of flow per customer, pounds of pollutant per customer, and comparisons between the approach used by Lynwood's consultant versus the standard approach are in Aquaeter's attached memo. As a result, the utility's analysis is not meeting state (1200-4-5-.08(1)) and federal (40 CFR Part D §122.45(b) requirements that "in the case of POTWs, or domestic wastewater treatment plants permit effluent limitations, standards, or prohibitions shall be calculated based on design flow."

The analysis provided by Aquaeter also indicates that with appropriate design calculations, essentially approving 350 additional hook-ups will increase the pollutant loads to the Harpeth. within permit Limits Also Aquaeter's analysis basically shows that the proposal by Lynwood is also an increase in design flow for the plant. Neither of these can be approved under the current EPA TMDL for the Harpeth, *Final Organic Enrichment/Low Dissolved Oxygen, September 2004.* The TMDL allocated the organic loads from the three sewage treatment plants based on Lynwood at a 400,000 gallon design flow. No more pollutant load can be permitted into the Harpeth in this water quality limited section. none is being permitted This was pointed out in our April 21, 2006 letter to TDEC WPC. Further discussion regarding the water quality conditions in the Harpeth in the summer, the TMDL, and the upcoming three NPDES permit renewals is in the section below.

Hydraulic flows into the plant are an essential aspect of plant design and to meet permit requirements. The low flows used by Lynwood's consultant have also affected the cost of the proposed tertiary treatment. According to Aquaeter's estimates, the activated carbon would need to be $420,000 or more to handle the increased flows, and the overall capital and operating costs for the filters and carbon over 20 years would be between $1 million to $4,125,000. Not only have not enough funds been set aside or negotiated for from the developer, but the costs to the rate payers at Lynwood, already one of the highest in the state, will go up. Though rates are not a TDEC issue, it will undoubtedly undermine the ability of the county to have people participate in the Grassland Sewer Project if the sewer rates at Lynwood are very high.

While the discussion has focused on how the proposed additional hook-ups and consultant calculations would essentially invite future permit violations, a look at the available DMRs for Lywnood found permit limit violations of BOD_5 and total nitrogen in the last two years. Also, the consultant in their August 4 letter to TDEC stated that Lynwood is only using half of their activated sludge system and one half of their anoxic system. These are physical operations that require notice to TDEC under the permit (Part II. B.), and if this is the case then this should be checked. These permit violations, though not nearly as frequent as in the past under prior owners, still are occurring when the plant is not even operating at its design capacity. This is BEFORE the 400 or more homes in the county septic sewer project are even hooked-up, much less for 350 proposed more new homes.

4. In the low-flow summer months, the Harpeth river flow below Franklin is effluent dominated. This will affect Lynwood and the two other NPDES permit renewals that are up this fall.

The Harpeth river mainstem from its beginnings in Eagleville, through Williamson County until the confluence of the South Harpeth in Cheatham County is listed on the 303(d) list as not meeting water quality standards for dissolved oxygen. Therefore, the Harpeth River is a water quality limited stream as defined under state and federal law. Field data from EPA for the TMDL, from TDEC in 2002, 2003, and from a current field project HRWA is conducting with TDEC's Nashville EAC field office have recorded levels of dissolved oxygen significantly below the state standard of 5 mg/l. Values by TDEC consistently below 2 and even as low as 0 mg/l in the river downstream of Franklin were recorded, low levels that can cause fish kills and create unhealthy septic conditions. Over 40 miles downstream in Kingston Springs the DO levels during these data recording periods had still not risen to 5 mg/l (see figs. 2-4, Aquaeter Sept. 06 study, attachment 4). There is no way this could be attributed to wastewater discharged 40 miles upstream

HRWA contracted Aquaeter to work with the EPA's river models developed for the TMDL, and to gather and analyze existing field data to address how the existing water quality issues in the river affect how to design a water withdrawal from the river just upstream from downtown Franklin for a proposed expanded drinking water plant. The final draft of this study by Aquaeter, *Water Quality Analysis of the Harpeth from Franklin to Kingston Springs*, September 2006, is the fourth attachment. Aspects of this study are in the Aquaeter memo on Lynwood to HRWA of Sept. 12, 2006 (attachment 3).

The fundamental findings from the field data and work to date with the EPA river models is that the Harpeth river flows in the late summer (when the river flow is lowest) can be from 20% to over 55% effluent dominated, and this is only with the Franklin sewer plant currently operating at half its design capacity of 12 MGD. (Exact figures are in the attached report). TDEC field data in August 2003 recorded a week when the DO level 4 miles downstream from Franklin STP was 0 mg/l and stayed there. The flow in the river before the first sewage treatment plant was 20 cfs and it took a rain event of 100 cfs to end the condition.

These low DO readings are occurring at flows NOT at the extremely low 7Q10 of 0.3 cfs, but at flows of 17 and 20 cfs (flow data is from the USGS gages during the TDEC and EPA field data). Essentially, this summer time low-flow water quality problem is not the result of permit violations, but that the overall flow in the river is too high a percentage of effluent, even with relatively high quality effluent. As the Aquaeter September 2006 study indicates, the high quality effluent is a major reason the DO sag continues so far downstream from the three sewage treatment plants. Aquaeter's report states that a rule of thumb for a river not to experience water quality violations is for the flow to not be more than 10% effluent.

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Aquaeter's work with the EPA TMDL models and the field data also highlight that each sewage treatment plant during these low flow conditions, as modeled, is discharging into waters of the state that violate state standards and cause a DO sag. Field data shows that the river flowing to the first sewage treatment plant, Franklin, has DO levels below standard and that even with highly oxygenated effluent, at times the DO is not up to standard before the Lynwood STP discharge. Then the combined river flow and two STP effluents discharge keeps DO below standard before Cartwright Creek discharges into the river.

Thus, with the five-year renewal cycle up this fall for all three NPDES permits, it will be necessary to figure a cost effective way to adjust the summer effluent discharge of these plants to eliminate the point source generated DO sag. With Franklin's effluent reuse program, which this summer has reused half (3 MGD) of its effluent versus discharging, there are systems in place to work with to develop a cost effective plan. In a conversation with Bill Melville, EPA TMDL branch, there is distinct interest to work on this, and redo the TMDL models using the field conditions in the river upstream up from the first sewer plant. At the time the models were run to make certain predictions, the DO in the river before Franklin was assumed to be 5 or 6 mg/l. However, recent field data are finding low DOs during this time of year.

Also, TDEC field staff and HRWA have coordinated a field study of DO for the entire river that is almost finished for 2006. One intent of the study was to move further downstream than the past field studies to see if the point where the river's DO no longer goes below 5 mg/l can be found—somewhere in the Narrows being likely. We also wanted the study to cover areas of the river above Franklin before the current water withdrawal or effluent discharges. CTE in their study of the river around Franklin for the recent Franklin ARAP proposal for a water withdrawal for an expanded drinking water plant found DO readings in the 2s during low flow conditions in October 2005.

Under the Clean Water Act and TN Water Quality Control Act, permits can not be authorized when "conditions of the permit do not provide for compliance with the applicable requirements of the CWA or regulations promulgated under CWA" (40 CFR Part D §122.4 (a) and (i)) or "TWQCA" (1200-4-5-.04(f)). Also, the federal and state anti-degradation rules require that the existing uses and water quality be maintained and protected (40 CFR §131.12.(a)(1)). The state anti-degradation policy will not allow discharges of substances into waters that are not meeting water quality standards for that substance (1200-4-3-.06 (1). Essentially, the Harpeth is a Tier I, water quality limited stream not meeting state dissolved oxygen standards. So the three existing NPDES permits have to be adjusted based on the above regulatory requirements since each discharger at this time of year is discharging into water quality limited waters and exacerbating the problem. Specific to Lynwood, the EPA TMDL model prediction is that assuming the river water flowing to Lynwood's discharge is 5 mg/l at 4pm in the afternoon (when DO is highest during the day), the Lynwood discharge would cause a DO sag of 1 mg/l. With this model prediction, any time the river water is below 5, then discharge from Lynwood is violating state standards by causing a DO sag.

does this ... from?

Certainly no new hook-ups to Lynwood can be legally justified and will have to wait until a plan is in place for the three NPDES dischargers that will eliminate the water quality problems. HRWA would like to coordinate a collaborative decision-making effort that includes TDEC, the permit holders, EPA, and HRWA to develop a cost effective and equitable plan and thus avoid considering each permit holder and sewer plant, much less a proposed water withdrawal just upstream of the three dischargers, in isolation. This would include considering how other failing septic areas in Grassland, in Eagleville in the headwaters, and water withdrawals for golf courses that could easily be using effluent from Franklin can be addressed. HRWA has been conducting a state grant in Eagleville to focus on stream restoration in the headwaters that will help with some of the water quality issues upstream. Recently, discussion has been resurrected as to whether Franklin might purchase Lynwood and eventually convert it to a pump station which would eliminate Lynwood as a discharger. This option can be considered within the larger plan as well, but until such time as Lynwood becomes something other than a point source designed STP, these discussions are immaterial to considering new hook-up proposals to Lynwood.

Thank you in advance for your timely consideration regarding rescinding the August 15 TDEC WPC letter, and for your needed leadership in working together in a collaborative manner to set precedent statewide and around the country for implementing a river-wide TMDL based plan to restore the Harpeth's water quality during the summer time.

Sincerely,

Dorene Bolze

Dorene Bolze
Executive Director
615 591-9095

Attachments:

1. Sections relevant to a permit modification in federal Clean Water Act

2. April 21, 2006 letter from HRWA to Paul Davis, Rogers Anderson and John Lackey

3. Memo to HRWA from Aquaeter, September 12, 2006—separate pdf file.

4. *Water Quality Analysis: Harpeth River between Franklin and Kingston Springs, TN.* Conducted by Aquaeter for HRWA. Prepared by John Michael Corn, E.I.T. and Michael Corn, P.E. September 2006.—separate pdf file.

cc: Rogers Anderson, Williamson County Mayor
Members of the Williamson County Commission
Members of the Williamson County Planning Commission
Members of the Williamson County Water and Wastewater Authority
Members of the Franklin Board of Mayor and Aldermen
Joe Horne, Community Development Director, Williamson County
Mike Matteson, Planning Director, Williamson County
Larry Robinson, Sewage Disposal Director, Williamson County
David Draughon, Division of Water Supply
Joe Sanders, General Counsel
Paul Davis, Water Pollution Control
Saya Qualls, Chief Engineer, TDEC
Ed Polk, Phil Simmons, Gary Davis, Robby Baker, Dan Eager, TDEC
Jeff Moseley, Esq.
Jay Johnson, Franklin City Administrator
David Parker, Franklin chief of engineering
City of Franklin Board of Mayor and Aldermen
Bo Butler and Steve Lane-- Smith Seckman, Reid
Matt Dobson, HRWA Board President and full HRWA Board
Kristi Earwood, Esq.
Elizabeth Murphy, Esq.
Joe McCaleb, Esq.

Doug Berry, Esq.
Tyler Ring, Lynwood Utility
David Schwab
Bob Alley, Alley Associates

Attachment 1:

Sections relevant to a permit modification in federal Clean Water Act

40 CFR Part D

§122.62 Modification or revocation and reissuance of permits (applicable to State programs, see §123.25).

When the Director receives any information (for example, inspects the facility, receives information submitted by the permittee as required in the permit (see §122.41), receives a request for modification or revocation and reissuance under §124.5, or conducts a review of the permit file) he or she may determine whether or not one or more of the causes listed in paragraphs (a) and (b) of this section for modification or revocation and reissuance or both exist. If cause exists, the Director may modify or revoke and reissue the permit accordingly, subject to the limitations of §124.5(c), and may request an updated application if necessary. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term. See §124.5(c)(2). If cause does not exist under this section or §122.63, the Director shall not modify or revoke and reissue the permit. If a permit modification satisfies the criteria in §122.63 for "minor modifications" the permit may be modified without a draft permit or public review. Otherwise, a draft permit must be prepared and other procedures in part 124 (or procedures of an approved State program) followed.

(a) *Causes for modification.* The following are causes for modification but not revocation and reissuance of permits except when the permittee requests or agrees.

(1) *Alterations.* There are material and substantial alterations or additions to the permitted facility or activity (including a change or changes in the permittee's sludge use or disposal practice) which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

§122.63 Minor modifications of permits.

Upon the consent of the permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of part 124. Any permit modification not processed as a minor modification under this section must be made for cause and with part 124 draft permit and public notice as required in §122.62. Minor modifications may only:

(a) Correct typographical errors;

(b) Require more frequent monitoring or reporting by the permittee;

(c) Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

(d) Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittees has been submitted to the Director.

(e)(1) Change the construction schedule for a discharger which is a new source. No such change shall affect a discharger's obligation to have all pollution control equipment installed and in operation prior to discharge under §122.29.

(2) Delete a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits.

(f) [Reserved]

(g) Incorporate conditions of a POTW pretreatment program that has been approved in accordance with the procedures in 40 CFR 403.11 (or a modification thereto that has been approved in accordance with the procedures in 40 CFR 403.18) as enforceable conditions of the POTW's permits.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38051, Sept. 26, 1984; 51 FR 20431, June 4, 1986; 53 FR 40616, Oct. 17, 1988; 60 FR 33931, June 29, 1995]

Attachment 2:

April 21, 2006

Rogers Anderson, Mayor
Williamson County
1320 West Main Street
Franklin, TN 37064

John Lackey, Chairman
Williamson County Planning Commission
Williamson County Water and Wastewater Authority

Paul Davis, Director
Water Pollution Control
TN Department of Environment and Conservation
401 Church Street
L & C Annex, 6th Floor
Nashville, TN 37243

VIA Electronic Mail and Postal Service

RE: Lack of sewer availability at Lynwood sewage treatment plant ((NPDES permit No. TN0029718) related to a proposed 379 single family residential subdivision (Chalmer's Cove) in the Grassland area, Williamson County

Dear Sirs:

The Harpeth River Watershed Association recently investigated the existing and proposed flow capacity for Lynwood Sewage Treatment Plant as a result of the proposed Chalmer's Cove subdivision of 379 single family residences that is proposed to be serviced by Lynwood which lies in Cottonwood subdivision and discharges into the Harpeth River a few miles downstream of the Franklin discharge. This letter provides an assessment based on flow of the sewer plant's capacity and addresses whether Lynwood has capacity to serve any additional users that are not part of county's grassland sanitary septic sewer project. Secondly, this letter addresses the larger issue of sewer availability in the Grassland area and some of the constraints to future development based on the water quality limitations to the Harpeth in this area. In closing, this letter offers some proposals that address existing and future sewer needs in the Grassland area within the context of the water quality limitations of both Lynwood and Cartwright Creeks and the mainstem of the Harpeth River.

1. Lack of sewer availability for new hook-ups to Lynwood unless new hook-ups are part of the county's septic sewer project in the Grassland area.

HRWA did an analysis of the flow capacity for Lynwood based on the actual number of existing and already permitted hook-ups with data provided from the Planning Department and analysis from the Sanitary Sewer Study of eight septic subdivisions in the Grassland area that was done for the Williamson County Water and Wastewater Authority by Smith Seckman Reid. While the planning department said that the data might be off by 5 to 10 homes, this information was accurate enough to assess whether there is sewer availability for another large subdivision such as Chalmer's Cove.

Table 1 provides the capacity assessment based on the design capacity of the plant as specified in Lynwood's NPDES permit with TDEC. As of April 2006, close to 857 total homes, which includes the remaining approved by unbuilt lots (about 65-70) in River Landing, Legends Ridge, and Chapelwood, are serviced by Lynwood. The plant also services the Walnut Grove Elementary School and a church. The total flow capacity for all these existing hook-ups is about 309,135 gallons per day (GPD). This flow rate is based on using 350 GPD/household which is a standard rate used to estimate flow per household. This rate is used by Franklin. This rate is used to capture not just the flow from the household but the flow that enters the plant from water infiltration into the collection lines that normally occurs and increases significantly during heavy rains. These flows that are not related to the actual customer base are designed for with a sewer plant since they affect the operation of the plant and can cause sewer plants to overflow. Lynwood has significant infiltration flows issues in the older Cottonwood subdivision that it was first built to serve and has had serious by-pass problems in the past because of stormwater infiltration. TDEC required that the influent pump station be upgraded to reduce the risk of failure and overflow as part of the moratorium that was placed on new hook-ups to the plant in June 2003 until this pump and the nitrogen removal system were installed.

The Lynwood STP permitted design capacity is 400,000 GPD of which around 300,000 is already being used by existing and approved though unbuilt taps. Lynwood's permit also specifically reserved 125,000 GPD for the use of hooking up nearby subdivisions with failing septic systems in Hillsboro Acres, Meadowgreen and Farmington. <u>This reserve sewer capacity was established as an integral part of the permit application to double the plant's capacity from 200,000 to 400,000 GPD and can not be reallocated except by TDEC</u>. Smith Seckman Reid's 2003 Sanitary Sewer Study looked at the options to treating failing septic systems in 8 subdivisions in the Grassland area (www.williamson-tn.org/co_gov/study/). This study estimated average flows of 139,200 GPD for the 4 subdivisions that are the focus of the county's project to provide sewer hook-ups to Lynwood. These 4 subdivisions include the three listed listed in the permit above and Brownwood. The estimated flow was based on 300 GPD. For Table 1, the estimated flow was based on the latest number of total homes in this area of the county septic sewer hook-up project (455) at 300 GPD for 136,500 GPD.

Based on the committed current sewer hook-ups and the future planned hook-ups with the county's project for the four septic subdivisions, the design flow assessment in Table 1 shows that <u>there is no remaining capacity for additional hook-ups to the Lynwood Sewage Treatment Plant outside the county Grassland sewer septic project.</u> If most of the homes in the four septic subdivisions hook-up, the plant is estimated to receive around 445,635 GPD in total which is more than its design capacity of 400,000 GPD. Thus, there is no room for another estimated 128,450 GPD from the 379 large homes proposed in Chalmer's Cove or for any other new development in the Lynwood service area with the plant's current design capacity. .

Alley & Associates provided a flowrate analysis of Lynwood on March 31 that states that Lynwood has capacity to serve Chalmer's Cove. There are two distinct differences in the analysis provided by Alley & Associates and the one presented here. The primary difference is that the one presented here is based on actual committed taps and using 350 GPD per household to find the estimate of the monthly flow rate while Alley & Associates used the average daily flow rate. This daily average will not accurately represent the infiltration of water into the collection lines or the high flows a plant will receive during heavy infiltration events. The discrepancy is nearly double from 164,000 GPD that Alley & Associates states as the daily average sewer flow and 309,135 GPD in Table 1 which is a monthly average sewer flow estimate. Secondly, Alley & Associates used 200 GPD and estimated 75,800 GPD of flow from the proposed Chalmer's Cove. Yet, the large homes proposed will likely average 4 bathrooms which generate daily flows that are more accurately estimated by using 350 GPD. Alley & Associates did use 350 GPD for the remaining approved but not yet built lots in Legends Ridge, River Landing and Chapelwood.

As TDEC notes in its letter to Lynwood April 10 (letter attached), the plant has to function all the time at all flow rates to meet the permit effluent discharge limits. TDEC stated that a comprehensive capacity assessment is needed and that it is inadequate to provide a simple analysis of flow rate showing possible available capacity as Alley & Associates letter does. As TDEC noted, the comprehensive capacity study would look at the amount of load the plant discharges, not just whether the effluent meets standards. Adding more hook-ups increases the load of pollutants that the plant processes, but also the amount the plant discharges into the Harpeth River. We understand that such a performance evaluation study which looks at how higher throughput affects the plant's ability to meet it permit limits as it gets closer to design capacity is underway by Barge Waggoner.

Though this performance evaluation study is likely being done in response to this subdivision proposal it is needed anyway as part of assessing what will likely be needed for the plant to meet its effluent concentration and load limits as it services the homes in the county's Grassland septic sewer project. A performance assessment is important especially in light of the history of significant violations with Lynwood that is very familiar to the county, TDEC and the public. The Lynnwood plant has had chronic problems with permit violations exceeding effluent limitations that go back to 1995 at least. TDEC issued several Notice of Violations since 1998 and noted a minimum of 50 violations between June 1999 – April 2002, including raw sewer overflows. The District Attorney filed a civil lawsuit against Lynwood for water quality violations and TDEC issued a moratorium on new hook-ups after learning during the 2002 permit renewal that the previous owners had not installed the required nitrogen removal equipment as part of the approval for the plant's capacity expansion to serve River Landing, Legends Ridge, and Chapelwood subdivisions. The court case that included a citizen suit was settled in June 2004 and involved paying court costs, $70,000 in penalties and $30,000 to the residents for damages. The current owners took over ownership at the time TDEC imposed the moratorium in the 2002 permit. The current owner installed the required equipment needed to lift the moratorium though they initially appealed the moratorium which effectively delayed the moratorium on hook-ups until 2003.

II. Sewer availability in the Grassland area and water quality limitations in the Harpeth and tributaries in the area

The mainstem of the Harpeth River from its beginnings in Eagleville, all the way through Williamson County until the South Harpeth flows into the Harpeth near Pegram in Cheatham County, is listed by the TN Department of Environment and Conservation as not meeting water quality standards for dissolved oxygen. These low oxygen conditions occur in the late summer during low flows because the excess nitrogen and other pollutants from the sewage treatment plants and from runoff feed algal blooms that remove too much oxygen from the water during the night. The low oxygen levels below state standards occur in several places, one just downstream of the Franklin plant and another downstream of the Cartwright Creek and Lynwood plants just after the confluence of the Little Harpeth near the Highway 100.

Because the Harpeth in this section violates water quality standards, a study and plan to determine how the pollutant loads will be reduced is required. Though TDEC typically does this plans, called TMDLs (total maximum daily loads), in this case, the EPA conducted the TMDL, "Final Organic Enrichment/Low Dissolved Oxygen for waters of the Harpeth River Watershed. (September 2004)." The EPA TMDL calls for significant reductions in the sediment oxygen demand that the plan equated to reductions in total nitrogen. The reduction amounts were then allocated between the existing point source discharges in the lower Harpeth (Franklin, Lynwood, and Cartwright sewage treatment plants), and non-point source runoff. The TMDL set the load that these 3 point source sewage treatment plants can discharge in terms of ammonia, nitrogen, and other pollutants for summer and winter periods.

As a result, there are no increases in loads of pollutants that can be allowed to these sewage treatment plants (known as point sources) under the TMDL. Not only are the pollutant loads from the discharge not allowed to increase, but increasing flows through these plants that is then discharged would also move the areas along the river where the dissolved oxygen goes below the standard (known as the "DO sag.") The Harpeth is already receiving more than it can assimilate. Essentially this means that any new sewer demand will have to be met by means that do not discharge into the Harpeth or any of the tributaries in the area.

In addition failing septic systems in the Grassland area are contributing pollutants to Cartwright Creek and Lynwood Creek. HRWA documented sites of nutrient enrichment and other signs of failing septic fields during our Visual Habitat Assessment around the Harpeth River watershed in 2001. Both these creeks are currently listed on TDEC's 303(d) list of impaired streams for habitat and streamside alteration and sedimentation from development and to a lesser extent from agricultural activities. HRWA is very supportive of the county's difficult but important project to hook-up the failing septic systems in the 8 neighborhoods in the Grassland area. This is not only an important effort to protect public health and private property values, but to improve water quality in both Cartwright and Lynwood Creeks as well as in the Harpeth River..

III. Recommendations related to new development and sewer needs in the Grassland area

Based on the issues that have been raised with the Chalmer's Cove large residential subdivision proposal, there are few recommendations listed below that have been gleaned from various conversations with TDEC staff, county staff, county commissioners, and county appointed officials. Clearly sewer availability is very limited at best in the Grassland area and is really only available for the county Grassland septic sewer hook-up project at this time. Though Lynwood has capacity, it is allocated to this project, and the Cartwright sewage treatment plant is running at capacity. These suggestions below might spark better ideas, or may already be in motion.

- TDEC and the County planning department work on a statement from TDEC for the county to have on file to provide to potential applicants for planning commission approval that sewer is not available in the Grassland area in the current configuration.

- TDEC and the county consult as part of making any decision regarding the release of the sewer reserve in Lynwood's permit. The county is taking on a hugely important and difficult effort to hook-up the neighborhoods with failing septic and the sewer reserve in the Lynwood is critical to that project.

- TDEC and the county consider requiring a sewer reserve for any new sewer expansion whether with the existing facilities or in the form of a no-discharge system in the Grassland area to enable the hook-up of other neighborhoods with failing septic systems that were studied in the Grassland Sanitary Sewer Study. Seriously consider how to prioritize connecting existing homes on septic if any new sewage treatment capacity is proposed.

- Continue to prioritize connecting existing neighborhoods with failing septic as part of discussions that involve the city of Franklin expanding its service area and/or in some form acquiring the Lynwood plant.

- County needs to require a new analysis of sewer availability and performance assessment by any potential applicant if an older letter is produced related to Cartwright Creek or Lynwood sewage treatment plants. Cartwright Creek sewage treatment plant serves 460 residences and 40 commercial interests with a design capacity of 250,000 GPD and is at capacity. An assessment of whether this facility could serve the nearby septic neighborhoods could be done to see if it is possible without increasing pollutant loads into the Harpeth. The SSR Grassland sewer study estimated a daily flow of 123,300 GPD to serve the 411 homes in Battlewood, Grassland Estates, and Sneed Forest.

HRWA realizes that addressing sewer issues is complex. The Grassland area brings to a fore the challenge and necessity to prioritize addressing existing problems to eliminate a public health threat and water quality problem. HRWA is very supportive of the county, TDEC and current Lynwood sewage treatment plant owners for their effort to address the urgent issue of failing septic systems in the Grassland area. The lack of more sewer capacity and the extent of existing failing septic systems is a major constraint in the Grassland area that will limit new development at the present in this area. HRWA is willing to work more closely with you to address how to resolve this challenge and help make the county Grassland septic sewer project a success.

Sincerely,

Dorene Bolze

Dorene Bolze
Executive Director
615 591-9095

Attachment: TDEC letter April 10, 2006 to Lynwood regarding initial flowrate assessment by Alley and Associates for Chalmer's Cove

cc: Members of the Williamson County Commission
Members of the Williamson County Planning Commission
Members of the Williamson County Water and Wastewater Authority
Members of the Franklin Board of Mayor and Aldermen
Joe Horne, Community Development Director, Williamson County
Mike Matteson, Planning Director, Williamson County

Larry Robinson, Sewage Disposal Director, Williamson County
Paul Sloan, deputy Director for TDEC
Saya Qualls, Chief Engineer, TDEC
Phil Simmons, TDEC
Gary Davis, TDEC
Jeff Moseley, Esq.
Jay Johnson, Franklin City Administrator
Bo Butler and Steve Lane, Smith Seckman, Reid
Kristi Earwood, Esq.
Elizabeth Murphy, Esq.
Doug Berry, Esq.
Tyler Ring, Lynwood Utility
David Schwab

P.O. Box 1127 ■ Franklin, Tennessee 37065 ■ Phone: 615-790-9767 ■ Facsimile: 615-790-9767 ■ www.harpethriver.org

Table 1. Current and Proposed Flow Capacity for Lynwood Sewage Treatment Plant

Basis for Determining Permitted Flow Design for Lynwood

1. Current Permitted Flow and design capacity = 400,000 gal/day
2. NPDES Permits based on Maximum Monthly Design Average Flow
3. Current Hook-ups have been established based on 350 gal/day per hook-up
4. This flow per hook-up establishes the Maximum Monthly Average Flow for Lynwood

LOCATION	LYNWOOD SEWER HOOK-UPS (# of Lots)	FLOW BASIS (gal/hook-up)	TOTAL FLOW (gpd)
		Actual	
River Landing	187	350 210	65,450
Legends Ridge	136	350	47,600
Addition 1	23	350	8,050
Addition 2	17	350	5,950
Legends Ridge and Cottonwood Club Houses	4 (1)		1,400
Chapelwood	5	350	1,750
Farmington	4	350	1,400
Jim Franks (in Legends)	1	350	350
Cottonwood	484	350	169,400
Walnut Grove Elementary School	17 (equivalent) (2)		6,000
Berry's Chapel Church	5 (equivalent) (3)		1,785
Total Existing (built and 65-70 permitted)	**879**	350 (210)	**309,135** (184,600)
County Grassland Septic Sewer hook-up project:Farmington, Meadowgreen, Brownwood, Hillsboro Acres	455	300 (4), (5)	136,500
Total Additional Planned	**455**		**136,500**
Total Existing or Planned Sewer Taps	**1,334**		**445,635**

NOTES:

(1) Clubhouses used in summer for swimming pool; Meeting rooms during rest of year. Estimated 2 house equivalent which low end.

(2) Walnut Grove Elem. School = 4,000 to 6,000 gpd when in session (must use this flow in calculating the Maximum Monthly Average Flow)

(3) Estimated 250 members attending one of 4 services on Sunday and 1 Wednesday * 50 gal/person/7days

(4) A range of flows should be considered from 200 to 350 gpd.

139,200 gpd of flow was estimated by SSR in the Grassland Sanitary Sewer Study based on 300 gpd per household.

P.O. Box 1127 ■ Franklin, Tennessee 37065 ■ Phone: 615-790-9767 ■ Facsimile: 615-790-9767 ■ www.harpethriver.org

BLACK & VEATCH

3011 Armory Drive
Suite 220
Nashville, Tennessee 37204-3721

Tel: (615)248-2666

Black & Veatch Corporation

City of Franklin, Tennessee
WWTP Renovation to 12 mgd

B&V Project 97374.320
B&V File A
May 29, 2001

Ms. Saya A. Qualls, P.E.
Tennessee Department of Environment and Conservation
Division of Water Pollution Control
6th Floor, L&C Annex
401 Church Street
Nashville, Tennessee 37243-1534

RECEIVED
MAY 30 2001
Permit Section

Subject: Draft Permit Comments

Dear Saya:

We have reviewed the draft NPDES permit for the Franklin, Tennessee Wastewater Treatment Plant with the City of Franklin and developed a list of questions and comments. We would like to convey to you our questions and concerns with the draft permit and request your consideration to incorporate our concerns in the permit. Following is an explanation of our questions and concerns:

1. The total nitrogen limit listed in the draft permit is a monthly average concentration of 5 mg/L and a monthly average loading of 380 lbs./day. We are concerned with ability of the Franklin WWTP to meet the mass loading limits during maximum month flows. We have tabulated the month to annual average flow ratios from 1996 through 2000 (see attached Table 1). Many of the months with high ratios occur in the winter and spring. However, there are some occurrences of high ratios in the summer months. As an example, we applied the month flow to annual average flow ratios for 2000 to an annual average flow of 12 mgd. We also assumed an effluent concentration of 3.5 mg/L total nitrogen (limit of technology). Table 2 lists the pounds that would be discharged for each month under this condition. As you can see, the monthly average loading for April and May would exceed the proposed limit.

seasonal ... that ... not applied ... late 2004

We are requesting that you consider changing the total nitrogen loading limit from a monthly average to a seasonal average, especially if you are considering adding April to the summer season.

2. In a previous telephone conversation, we discussed the possibility of adding April to the summer season. Based on historical data, flows in April are generally higher than the annual average flow. If we consider the same maximum month flow as we used above for April (18.12 mgd), the effluent concentration would need to be 0.26 mg/L to meet the monthly average loading of 40 lbs./day. This limit would be very hard to meet considering it is much more difficult to fully nitrify in April due to the temperature of the wastewater.

okay

We are requesting that you consider not adding April to the summer season. If April must be added to the summer season, we request you consider an alternate means to demonstrate compliance (i.e. an ultimate oxygen demand limit in lieu of separate BOD_5 and ammonia limits

City of Franklin, Tennessee
Ms. Saya A. Qualls, P.E.

B&V Project 97374.320
May 29, 2001

or consider a seasonal average limit for ammonia). Consideration should be given to the fact that during events of high wastewater flows in April, the receiving stream flow will be higher than conditions input into the model for summer flows.

3. The reporting requirements of the pollutants monitored under the pretreatment program in the draft permit require maximum and average values be reported if the pollutants are analyzed more frequently than required. Are the pass through limitations for the pollutants considered a maximum or an average value? The metals are not currently listed under the effluent limitations and monitoring requirements.

double check w/ CGD

4. The pass through limit for carbon tetrachloride included in the table attached to the draft permit is 0.005 mg/L. The pass through limits provided by Chuck Durham, via a letter to Larry Potteet dated May 2, 2001, included a limit of 0.015 mg/L for carbon tetrachloride. Please indicate which limit is correct.

ck w/ CGD

5. The biomonitoring requirements for whole effluent toxicity testing require that a total of five serial dilutions and a control be performed quarterly. The draft permit requires that the reduction in survival, reproduction, and growth of the test organisms in 100 percent effluent be less than 25 percent as compared to the controls. We do not understand the need for the other four dilutions (50%, 25%, 12.5%, and 6.25%). We understand that the additional dilutions would be required to conduct a Toxicity Identification Evaluation/Toxicity Reproduction Evaluation (TIE/TRE) study. However, the TIE/TRE study is only required if two consecutive tests conducted with 100 percent effluent fail or three tests fail within a 12-month period. The four additional serial dilutions will increase the cost of the toxicity tests significantly.

The previous permit defined a "significant test failure" as a test result that demonstrates toxicity in less than or equal to 4/5th's of the permit limit. We understand that the 20 percent dilution allowance was provided to offset the uncertainty of WET testing. Can you please let us know why this allowance is not provided in the draft permit?

We request that you consider eliminating the need for the four additional serial dilutions.

Serial dilutions are necessary for adherence to standard test protocols. Additionally, should the effluent fail the exact ~~ext~~ toxicity must be known for compliance purposes.

The 4/5'ths the concentrations

≤ 95 dilution

IC25 more definative endpoint

6. The draft permit does not include a compliance schedule. Included below is a list of the milestone dates for the WWTP Renovation to 12 mgd project. We request you consider adding the Plant Startup date as the date of compliance.

it will

Submit Plans and Specs to TDEC for Review and Approval	November 2001
Obtain TDEC Approval	February 2002
Advertise for Bids	February 2002
Award Contract	April 2002
Issue Notice to Proceed	May 2002
Construction Substantial Completion	April 2004
Plant Startup	May 2004

No problem

We hope you will consider the draft permit modifications requested by the City of Franklin. If you have any questions concerning our comments, please do not hesitate to call. Your consideration of these modifications is greatly appreciated.

Very truly yours,

BLACK & VEATCH

M. Shannon Lambert

M. Shannon Lambert, P.E.

cc: Eddy Woodard
Vic Bates
Roger Lindsey
Chris deBarbadillo

TABLE 1

Franklin, TN WWTP
Ratio of Month Flow to Average Flow

Month	1996	1997	1998	1999	2000	Average Ratio of Month Flow to Annual Average flow
January	0.77	1.10	0.88	***1.83***	0.73	1.06
February	0.90	1.07	0.91	***1.38***	0.95	1.04
March	1.14	***1.64***	0.83	***1.55***	0.97	***1.23***
April	1.09	0.87	***1.20***	0.87	***1.51***	***1.11***
May	1.19	1.05	0.94		***1.33***	***1.13***
June	1.14	***1.51***	***1.21***	0.87	0.99	***1.14***
July	0.97	***1.32***	1.05	0.80	0.93	1.01
August	0.91	0.56	0.81	0.68	0.97	0.79
Septembe	0.91	0.53	0.89	0.77	0.91	0.80
October	0.83	0.72	0.97	0.66	0.75	0.79
November	1.00	0.82	0.97	0.75	0.98	0.90
December	1.14	0.81	1.29	0.80	1.00	1.01

TABLE 2

Franklin, TN WWTP

12 mgd Annual Average Flow

Pounds of nitrogen discharged for flows similar to 2000 monthly flow pattern

Month	2000 Flow ratios	Month Flow if average = 12 mgd	Pounds discharged if TN = 3.5 mg/L
January	0.73	8.76	256
February	0.95	11.4	333
March	0.97	11.64	340
April	*1.51*	18.12	529
May	*1.33*	15.96	466
June	0.99	11.88	347
July	0.93	11.16	326
August	0.97	11.64	340
Septembe	0.91	10.92	319
October	0.75	9	263
November	0.98	11.76	343
December	1.00	12	350
Seasonal Average without April			343
Seasonal Average with April			370
Annual Average			351

From: Saya Qualls
To: kagey.connie@epa.gov
Date: 5/16/01 5:35PM
Subject: Franklin's effluent requirements for N and P

Connie,

In response to your request, please consider the following:

The NO3/NO2: TP ratio in ecoregion reference streams in 71(g, h & i) is approximately 5:1. One would assume that the TN:TP ratio would be slightly higher, though we don't have that data. With that ratio, it would appear that the streams in this ecoregion are generally nitrogen-limited as opposed to phosphorus-limited. In fact, this area was once heavily mined for phosphorus, so we are not surprised to find phosphorus-rich conditions. A TN:TP ratio of 10:1 or higher would likely be indicative of phosphorus-limited conditions.

As indicated in my previous e-mail, the river is not listed as being impaired due to nutrients, but rather organic enrichment/D.O. Nutrients are of concern only in so far as they can cause algae to bloom, thus increasing the downward swing in diurnal D.O.'s and that decaying algae can contribute to SOD.

During the low-flow regime of the Harpeth River, the TN:TP ratio is dominated by the effluent from Franklin's STP. We have TN data on Franklin's effluent as opposed to NO3/NO2, however, the majority of the TN is probably NO3/NO2. We know this because the wastewater treatment process converts ammonia to NO3/NO2 and that ammonia concentration is very low (permit limit is 0.4 mg/l). We do not know the make up of the phosphorus in Franklin's effluent. The ratio of TN:TP in Franklin's effluent is approximately 2:1 (see table below). TN is slightly more variable than TP.

Our goal is to limit Franklin's effluent in such a way so as to prevent algal blooms downstream from Franklin's effluent. The reasons for limiting N instead of P are as follows:

1. Effluent and ecoregion appear to be nitrogen-limited.
2. The NO3/NO2 component of the TN is readily available for algae.
3. Limiting the more variable TN to 5 mg/l should keep the TN:TP ratio in line.

Note that the permit will include a TMDL specific reopener clause that can be used to "fix" things should the TMDL come up with a different approach than the permit. Another point to ponder is that these limits are not scheduled to be in place until December 2004.

	Effluent Data			W/ Proposed TN limit of 5 mg/l	
	TN	TP	Ratio		Ratio
average		2.56	1.07	2.4:1	4.7:1
std dev		1.35	0.83		
95th %ile		4.79	2.44	1.96	2.0:1
99th %ile		5.71	3.01	1.81	1.7:1

Thanks,

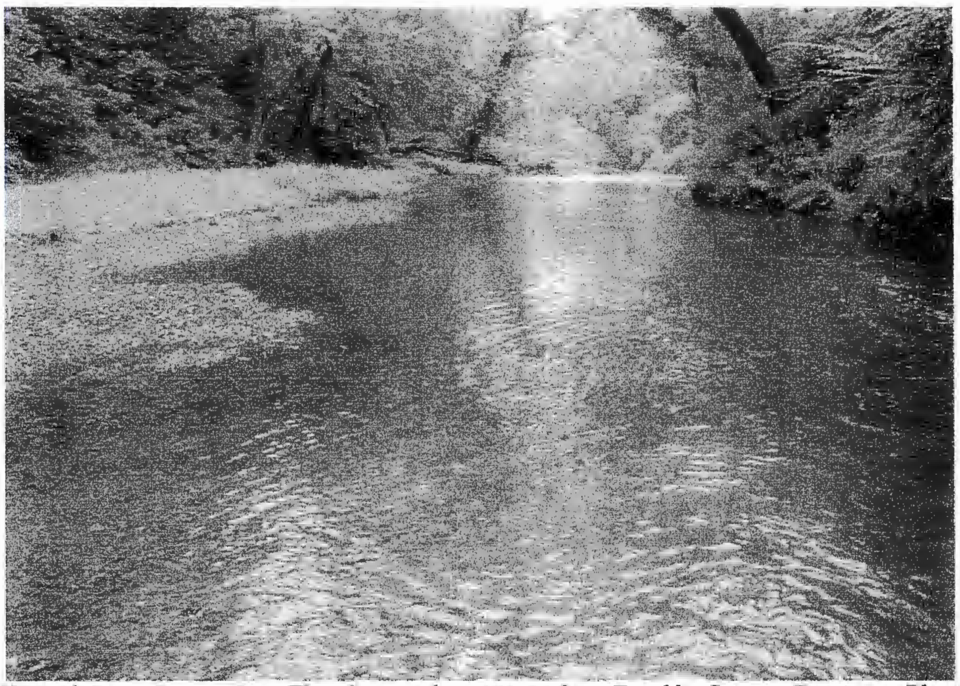
Saya

Gary Davis 4-28-08

HARPETH RIVER WATERSHED ASSOCIATION

Dissolved Oxygen in the Harpeth River

August-September 2006



Harpeth River During Low Flow Season downstream from Franklin Sewage Treatment Plant

February 2007

Contributing Authors:

Dorene Bolze **Michael Cain** **John McFadden**

Harpeth River Watershed Association
PO Box 1127 Franklin, TN 37065
www.harpethriver.org hrwa@harpethriver.org

Work funded, in part, by World Wildlife Fund and Patagonia.

WWF

patagonia

Table of Contents

Dissolved Oxygen in the Harpeth River
August-September 2006

Introduction

The Harpeth River Watershed Association (HRWA) is a 501(c)(3) not-for-profit conservation organization whose mission is to protect and restore the Harpeth River Watershed and provide expertise in statewide conservation policy. HRWA possesses a core scientific staff and has a Science and Technical Advisory Group comprised of experts from various state and federal agencies, academic institutions, and private sector firms who provide assistance in field study design and analysis. In addition, HRWA utilizes volunteers, and some are experts in their fields, to conduct many of its activities including research. In addition to core staff, technical advisors, and volunteers, HRWA works with resource and regulatory agencies such as the Tennessee Department of Environment and Conservation (TDEC), the US Geological Survey (USGS), the Tennessee Wildlife Resources Agency (TWRA), US Fish & Wildlife Service (USFWS) and the US Environmental Protection Agency (EPA).

Purpose

The purpose of this field study with TDEC was to measure dissolved oxygen (DO) concentrations along the Harpeth River mainstem for most of its length during the low flow season in order to fill data gaps and provide further data on current conditions to guide permitting decisions. One current permit issue is a proposal to increase the withdrawal of water from the Harpeth for an expansion of the city of Franklin's drinking water plant from 2 to 4 million gallons a day (MGD). This withdrawal is only four river miles upstream from the City's 12 MGD Publicly Owned Treatment Works (POTW) which is then followed by two much smaller sewage treatment plants not far downriver. One of the aspects of the study was to provide further DO data and river flow data to help with other analyses referenced in this report. Other aspects include determining in-stream flow needs that would prevent low dissolved oxygen problems and provide assimilative capacity. The final aspect of the study was to gather more date to ascertain that the flow is adequate for the river to meet its designated uses for fish and aquatic life and recreation.

Another intent of this study and report was to begin compiling the various documents and data on DO along the Harpeth River as part of the next steps in analyzing cost effective management solutions to reduce the low dissolved oxygen problem. The Appendices include recent field data from TDEC since 2002 and the report provides references to other important field data and analyses, such as EPA's DO data from its work to produce the Final Organic Enrichment/Low Dissolved Oxygen Total Maximum Daily Load (TMDL) for the Harpeth River[1], and studies done as far back as 1987 by Barry Sulkin[2]. This study is an extension of prior DO studies HRWA has conducted that are included in this report. All the references in this report are available either on the HRWA web site or upon request.

Dissolved Oxygen

Dissolved oxygen is critical to the health of aquatic systems with a generally accepted minimum of 4 mg/L for maintaining aquatic life. Although, sustained levels below 5 mg/L impair biological function result in decreased productivity[3]. Oxygen levels are subject to variation based on time of day, time of year, flow, atmospheric conditions and anthropogenic influence. Plants, such as algae, produce oxygen as a byproduct of photosynthesis, increasing oxygen content of surface waters during daylight hours, though reducing oxygen in the surface waters during nighttime hours due to algal respiration. In addition, input of DO in rivers occurs through the water surface/air interaction primarily in areas of turbulence, such as riffles. In the state of Tennessee, the water quality standard for dissolved oxygen to support fish and aquatic life is 5 mg/l at all times with specific exceptions set at higher concentrations for trout streams (Chapter 1200-4-3-.03(3)(a)).

Sources of DO degradation include plant and animal respiration as well as bacterial processes of degradation of organic material from natural inputs such as leaf litter and from anthropogenic sources such as sewage treatment plant effluents (biochemical oxygen demand - BOD). Oxygen depletion also occurs as a result of a wide variety of substance degradation, including sediments (sediment oxygen demand- SOD)[4] and agricultural and industrial chemicals (chemical oxygen demand- COD)[5].

Water volume or flow positively correlates with DO concentration. Higher flows typically carry higher amounts of dissolved oxygen, while water's ability to hold oxygen is inversely related to temperature. Water at 0°C can hold approximately 14 mg/L of DO at 100% saturation where water at 35° C can only hold approximately 7 mg/L[6]. The total amount of DO (concentration x volume) is a primary factor in a stream's capacity to assimilate waste products as measured by BOD. In simple terms, to maintain DO levels in the river at or above the state standard of 5 mg/L, for every pound of oxygen demanding material (BOD) added to the river, one pound of extra oxygen has to already be in the river or the algae or natural aeration factors have to add this one pound of additional oxygen. Low flow and increased temperature conditions in the summer months represent the limiting conditions relative to DO and thus a river's assimilative capacity. Additionally, during the critical summer low flows, natural reaeration is at a minimum which compounds the problem of oxygen replenishment.

Biological Condition

As part of the city of Franklin's effort to study if the Harpeth can support an increase in its withdrawal of water for a larger drinking water plant, several field studies were conducted. One involved a fish and macroinvertebrate study by Pennington and Associates (PAI)[7]. The PAI survey was carried out in March of 2006 and demonstrates that the river at each station is slightly impaired based on comparisons of BMI data to the 71h ecoregional reference stream data. Metrics calculated for the analysis included but were not limited to percent Oligochaetes and Chironomids, percent EPT and the North Carolina Biotic Index (NCBI). The NCBI ranges from 0 (pollution intolerant) to 10 (pollution tolerant). NCBI values ranged from 4.79 (stations 3 and 4) to 5.63 (Station 6) with an average of 5.12. The average NCBI of 5.12 is indicative of an intermediately pollution tolerant BMI community. Oligochaetes and Chironomids ranged from 27.71% (Station 5) to 61.97% (Station 1) and averaged 47.21%. Oligochaetes and Chironomids are primarily pollution tolerant and thus high numbers for this metric indicate a stressed system. Lastly, EPT ranged from 4.18% to 19.91% with an average of 10.07%. EPT species are primarily pollution sensitive and thus low percentages in this metric indicate a stressed system. The BMI sample, represented by the BMI index scores and in particular, the above referenced metrics indicates the system is under significant stress. Other benthic macroinvertebrate data have also been collected on the main Harpeth as well. For example, the city of Franklin does an annual benthic survey as part of its NPDES permit for its sewage treatment plant. This report on the DO 2006 field survey is not meant to be an exhaustive review and analysis of all the data available.

The PAI study also conducted a fish survey and found 33 species of fish across all the stations sampled in the river's section through downtown Franklin between the low head dam and the Franklin STP discharge. The fish communities are considered to reflect "Fair" ecological conditions for four sites and "Poor to Fair" for the remaining two sites when compared to reference stream data provided by the Tennessee Valley Authority for the Nashville Basin Ecoregion based on Index of Biotic Integrity (IBI) data. At one site downstream from the Franklin Road bridge, the small scale darter (*Etheostoma microlepidum*) was found. This species is considered by TDEC to be a species "Deemed in Need of Management" or a species of "Special Concern." This species range is now limited to the Harpeth and Red Rivers, according to Dr. Etnier and Dr. Starnes in The Fishes of Tennessee (1993).

Methods and Materials

HRWA enlisted a corps of volunteers to collect and process samples during six-hour shifts on three sampling days. The volunteers utilized the Winkler Titration method as it continues to be the standard by which other methods are judged[3]. HRWA volunteers utilized the LaMotte dissolved oxygen kit (Liquid Acid Version, Catalogue #5860). Volunteers were trained with new or newly replenished DO kits, and supplied with a LaMotte thermometer # 61066 (0.5 degrees C increments). Training included lecture, hands-on use of the kits with instructor support, and hands-on use with instructor feedback. Specifically, trainers demonstrated the titration procedure and presented information regarding the chemistry involved. Each volunteer performed the test at least twice while being observed by the instructor until competency in the method and an accurate reading of the results were achieved.

In addition to the volunteer effort, the Tennessee Department of Environment and Conservation (TDEC) deployed a continuously reading diurnal probe at three locations for a two- week period. The intent was to bracket the time that the HRWA volunteers were gathering data and for TDEC's sites to bracket the HRWA sites along the river by having TDEC sampling sites the furthest upstream and downstream.

Site Locations

Site locations, including site numbers, latitude/longitude and volunteers are presented in Table 1. The overview map includes all sampling location, while Maps 1 – 6 show details of sampling locations in Eagleville, Franklin, North Williamson County, Bellevue and Kingston Springs areas respectively. Sites were chosen to cover an approximate 100-mile stretch of the Harpeth River in an effort to develop current DO data during the River's seasonal low flow period (June- November typically). During site selection, consideration was given to locations of sewage treatment plants, the city drinking water withdrawal site, accessibility and safety. Priorities included having a sampling site downstream from each of the three sewage treatments in Williamson County (River Miles noted on Table 2), and downstream from the water withdrawal for the Franklin drinking water plant, that is just upstream from the three sewage treatment plants. (See maps for location and size capacity). Another priority was to go further downstream than EPA did in 2000 and 2001 and TDEC had gone more recently on the Harpeth into Cheatham County to see if the area could be located in the river that is downstream from the "DO sag" at which point dissolved oxygen levels were not going below state standards from anthropogenic causes. The location of sites was also influenced by previous sampling locations of the EPA and TDEC to help provide data from the same location where possible so that the growing data set could help with analyzing trends.

Another consideration was to locate data collection sites at least one mile downstream from discharges to allow time for effluent and natural flows to mix and thus mitigate effects of dissolved oxygen injected effluent. This was done to get an accurate value of the river's response to inputs of organic materials in effluents. The exception to this requirement was Site 4, which was 0.8 miles downstream of the Franklin sewage treatment plant (STP). Safety and accessibility dictated this location.

Photographs showing upstream and downstream views were gathered for each site, and suitability was assessed as to location of riffles, runs and pools. Runs were chosen as the most representative portion of the river to collect samples because they represent stream conditions intermediate of oxygenated riffles and depleted pools.

Table 1 - Dissolved Oxygen Site Numbers, Locations, Latitude/Longitude and Volunteers

Site Number and River Mile*	Description	Lat.	Long.	Volunteer(s)
Site 1: RM 115.1	Hwy 31 north of Eagleville	35.7636	-86.6428	Kendra Floyd
Site 2: RM 99.5	Trinity Lane near Arno Rd	35.8642	-86.7678	Joe & Beth Bankemper
Site 3: RM 87.3	Hwy 31 north of Franklin City Limits	35.9275	-86.8656	Jim Chittum
Site 3.5: RM 86	Behind Chestnut Bend Subdivision	35.9369	-86.8703	Pam Davee
Site 4: RM 84.5	Hwy 431 north of Mack Hatcher Pkwy	35.9483	-86.8769	Jim Chittum
Site 5: RM 81.3	Fieldstone Farms	35.9600	-86.8914	Carol Byrd
Site 6: RM 74.9	Old Hillsboro Pike	35.9931	-86.9025	Dale Whitehead
Site 7: RM 65.9	Sneed Road	36.0286	-86.9242	Chuck Robinson
Site 8: RM 52.3	Newsom's Mill	36.0806	-86.9964	Greg & Rebekah Pope
Site 9: RM 35.3	Kingston Springs off Street Road	36.1033	-87.1253	Terry McCowan
Site 10: RM 22.7	Narrows of the Harpeth (take out)	36.1525	-87.1192	Terry McCowan

*The River Miles are set by starting at the highest river miles in the headwaters at river mile 126 and going to the mouth of the Harpeth river at the confluence with the Cumberland River. Thus, low river mile numbers are closer to the Cumberland River. The study's data are arranged from headwaters in Rutherford County to the Narrows of the Harpeth, in Cheatham County.

Sampling Regime

In order to collect a representative sample of diurnal patterns of oxygen content, volunteers were instructed to pick a time between 4:00 am and 6:00 am and to collect samples every six hours for a 24-hour period. Volunteers conducted this regime on three separate days and were asked to allow at least one day between collections. This regime was carried out at all sampling stations except Sites 9 and 10. This site's volunteer was not able to conduct the third sampling event.

Real-time flow data was taken from the USGS gages via the internet. The gages utilized were Franklin (USGS 03432350), below Franklin (USGS 03432400), Kingston Springs (03434500) and Bellevue (USGS 03433500). The flow results included in the raw data sheets were from the nearest USGS gage. Several sites are considerably downstream from the USGS gages (see Figures 2 – 5 in Appendix B). Thus, at some of the sampling stations actual flows are higher than what is reported as flows in the summary data on Table 2 and raw data sheets in Appendix D.

Results

The purpose of this study was to document the current dissolved oxygen levels in a 100-mile long section of the Harpeth River mainstem during low flow seasons. To this end, 11 volunteers sampled 11 sites over a three week period, four times per day, for three days in order to capture diurnal swings. All raw data sets are presented in Appendix D for the HRWA sites. The minimum, average and maximum DO readings for each HRWA site are presented in Table 2 and Figure 1. TDEC's data were collected from September 8, 2006 through September 20, 2006 utilizing a continuously (one reading per ½ hour interval) monitoring diurnal probe. The three DO graphs are in Appendix C along with some discrete DO data measured at other locations at certain times of day by TDEC in the summer of 2006. TDEC has significantly more discrete DO data in an ACCESS database that is available upon request. According to James Smith, the TDEC aquatic biologist who worked on this field study with the diurnal probes, the initial and final calibrations were off by approximately 20% at the RM 28.5 sampling site.

USGS flows are presented in Appendix B from the web site, and are also provided in Table 2 and in Appendix D. The notes in Appendix D explain which USGS gage the flow data are from since it wasn't always logical to report the flow from the nearest upstream gage that could be 20-30 river miles away when the downstream gage was much closer to the sampling site. These flow figures were compiled to make it easier to see what river flows were occurring when the various DO concentrations were collected. Documenting actual field conditions of DO concentrations at specific river flows is relevant to analyzing the permit application proposal to cutoff water withdrawals if the river's flow is below 5 cfs as measured at the USGS gage at Franklin (Appendix B, Figure 2). The withdrawal proposal is also to only withdraw 20% of the flow when above the 5 cfs cutoff.

Two HRWA sites were very close to two TDEC sites. The TDEC and HRWA sites at Newsom's Mill were only 0.3 river mile apart (HRWA site 8, TDEC RM 52.3). Data was gathered during the same time period as well. A comparison of the DO concentrations from these sites show that the methodology for this survey of using the Winkler Titration method along with the four times per day sampling regime over three different days by the HRWA volunteers collected very similar data in terms of minimum, average and maximum DO readings as the diurnal probe deployed by TDEC.

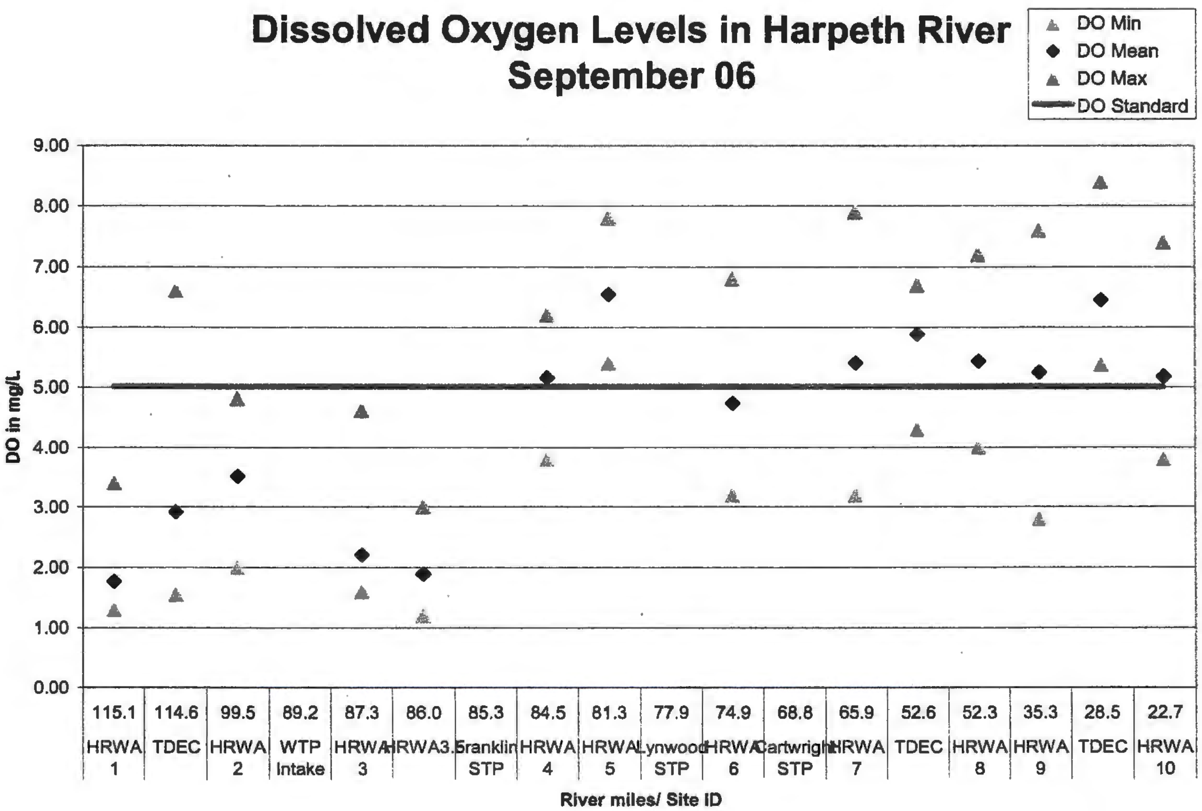


Figure 1: Dissolved Oxygen concentrations for HRWA and TDEC 2006 sampling sites. The figure also notes the river mile location of the Franklin drinking water withdrawal and the three sewage treatment plant discharges. The percent saturation for the HRWA data is reported in Appendix D.

Table 2: HRWA 2006 DO Data Summary 10-16-06

Site #	River Mile	Description	Date	Event		Temperature	DO	Flow
				3 samples		degrees C	mg/L	cfs
1	115.6	off Hwy 41A north of Eagleville	9/7-8/06	1	max	22.0	3.4	no data
					av	20.58	2.07	no data
					min	18.0	1.6	no data
			9/10-11/06	2	max	21.0	1.7	no data
					av	22.13	1.55	no data
					min	23.0	1.3	no data
			9/15/2006	3	max	21.0	1.8	no data
					av	20.9	1.69	no data
					min	20.5	1.6	no data
		Site 1 totals	9/7-15/06		max	23.0	3.4	no data
					av	21.20	1.77	no data
					min	18.0	1.3	no data
2	99.5	Trinity Rd near Arno Rd	9/28/2006	1	max	18.6	4.8	no data
					av	18.43	3.78	no data
					min	18.2	3.2	no data
			9/30/2006	2	max	18.0	4.1	no data
					av	17.75	3.34	no data
					min	17.5	2.0	no data
			10/1/2006	3	max	22.0	4.2	no data
					av	19.23	3.45	no data
					min	17.5	2.3	no data
		Site 2 totals	9/7-15/06		max	22.0	4.8	no data
					av	18.47	3.52	no data
					min	17.5	2.0	no data
3	87.3	below Hwy 31 bridge in Franklin	9/10-11/06	1	max	27.5	2.6	2.9
					av	20.83	2.26	2.83
					min	23.5	1.8	2.8
			9/14/2006	2	max	20.5	2.5	4.8
					av	19.13	2.23	4.73
					min	18.5	1.9	4.5
			9/17/2006	3	max	25.5	2.4	6.5
					av	22.38	2.15	6.23
					min	19.5	1.6	6.0
		Site 3 totals	9/10-17/06		max	27.5	2.6	6.5
					av	20.78	2.21	4.60
					min	18.5	1.6	2.8
3.5	86.0	next to Chestnut Bend Subdivision	9/20/2006	1	max	19.0	2.5	10.0
					av	17.75	1.78	9.73
					min	15.0	1.2	8.9
			9/22-23/06	2	max	23.0	2.3	12.0
					av	20.50	1.70	11.00
					min	18.0	1.2	10.0
			9/24-25/06	3	max	22.0	3.0	8.9
					av	20.25	2.20	7.60
					min	18.0	1.7	6.0
		Site 3.5 totals	9/20-25/06		max	23.0	3.0	12.0
					av	19.50	1.89	9.44
					min	18.0	1.2	6.0

Site #	River Mile	Description	Date	Event		Temperature	DO	Flow
				3 samples		degrees C	mg/L	cfs
4	84.5	1/4 mi east of Hwy 431 bridge	9/10/2006	1	max	26.5	5.5	20.0
					av	25.25	4.71	16.75
					min	23.5	3.8	14.0
			9/14/2006	2	max	20.5	6.2	22.0
					av	19.00	5.63	21.00
					min	18.0	5.0	18.0
			9/17/2006	3	max	25.0	6.0	19.0
					av	22.63	5.14	17.75
					min	20.5	4.5	15.0
		Site 4 totals	9/10-17/06		max	26.5	6.2	22.0
					av	22.29	5.16	18.50
					min	18.0	3.8	14.0
5	81.3	behind Fieldstone Farms	9/8-9/06	1	max	24.5	7.0	21.0
					av	23.46	6.12	17.50
					min	22.0	5.4	15.0
			9/15-16/06	2	max	23.0	7.3	21.0
					av	21.25	6.66	19.25
					min	20.0	6.0	18.0
			9/21-22/06	3	max	19.5	7.8	20.0
					av	19.13	6.86	18.00
					min	19.5	6.1	14.0
		Site 5 totals	9/8-22/06		max	24.5	7.8	21.0
					av	21.28	6.55	18.25
					min	19.0	5.4	14.0
6	74.9	below Old Hillsboro Pike	9/5/2006	1	max	24.0	6.2	22.0
					av	22.79	5.04	20.00
					min	21.5	4.2	17.0
			9/10/2006	2	max	24.5	6.6	20.0
					av	23.92	4.23	17.00
					min	23.5	3.2	15.0
			9/16-17/06	3	max	22.0	6.8	21.0
					av	21.13	4.95	19.42
					min	20.0	4.0	17.0
		Site 6 totals	9/5-17/06		max	24.5	6.8	22.0
					av	22.61	4.74	18.81
					min	20.0	3.2	15.0
7	65.9	below bridge at Sneed Road	9/5-6/06	1	max	27.0	7.9	22.0
					av	23.96	6.00	19.75
					min	22.0	4.2	22.0
			9/8-9/06	2	max	25.5	7.4	20.0
					av	24.13	5.34	17.75
					min	22.5	2.4	14.0
			9/13-14/06	3	max	25.0	7.3	27.0
					av	22.04	4.85	22.42
					min	20.0	3.2	18.0
		Site 7 totals	9/5-14/06		max	27.0	7.9	27.0
					av	23.38	5.40	19.97
					min	20.0	3.2	14.0

Site #	River Mile	Description	Date	Event		Temperature	DO	Flow
				3 samples		degrees C	mg/L	cfs
8	52.3	Newsom's Mill	9/4/2006	1	max	23.5	6.0	24.0
					av	22.63	5.10	21.25
					min	22.0	4.0	19.0
			9/9-10/2006	2	max	24.5	5.6	14.0
					av	23.38	4.98	12.50
					min	22.0	4.0	11.0
			9/17/2006	3	max	23.0	7.2	15.0
					av	22.13	6.22	14.00
					min	21.0	5.1	13.0
		Site 8 totals	9/4-17/06		max	24.5	7.2	24.0
					av	22.71	5.43	15.92
					min	21.0	4.0	11.0
9	35.3	just upstream of Turnbull Creek	8/27-28/06	1	max	24.0	7.6	102.0
					av	23.00	4.92	102.00
					min	22.0	2.8	102.0
			9/2-3/06	2	max	24.0	7.4	135.0
					av	23.00	5.57	125.50
					min	22.0	3.2	114.0
				3	max			
					av			
					min			
		Site 9 totals	8/27/06-		max	24.0	7.6	135.0
			9/3/2006		av	23.00	5.25	113.75
					min	22.0	2.8	102.0
10	87.3	Narrows of the Harpeth take out	8/27-28/06	1	max	24.0	6.8	102.0
					av	22.50	4.7*	102.0
					min	22.0	4.4	102.0
			9/2-3/06	2	max	24.0	7.4	135.0
					av	23.50	5.18	125.5
					min	23.0	3.8	114.0
				3	max			
					av			
					min			
		Site 10 totals	8/27/06-		max	27.5	7.4	135.0
			9/3/2006		av	23.00	5.18	113.75
					min	18.5	3.8	102.0
		* outlier is removed from analysis, the data point (2.8) in DO for 8/27/06,						
		site 10, is 3.9 standard deviations from mean.						

Results indicate and corroborate field data from previous years that dissolved oxygen levels during low flow conditions are not meeting state water quality standards. At all the HRWA sites except Site 5 (four miles downstream from the Franklin STP), the minimum DO concentrations were below 5 mg/L. For all the HRWA sites upstream from the Franklin STP, the DO concentrations never got above 5 mg/L. For these sites, along with the TDEC site in Eagleville, the average DO concentration was not over 3.5 mg/L. The TDEC Eagleville site (RM 114.6) measured maximum DO concentrations above 6.5 mg/L. Also the sites in Eagleville and in downtown Franklin downstream from the water withdrawal but upstream from the city STP had averages at 2 mg/L or below and minimum DO concentrations at almost 1 mg/L.

Just one river mile downstream for the Franklin STP discharge, the HRWA Site 4 measured minimum DO concentrations around 4 mg/L and below with an average concentration of 5.16 mg/L. The only HRWA site where all DO concentrations were above the state standard was Site 6 that is four river miles downstream from the Franklin STP. This is likely a result of the effect of the mixing of the treated effluent that is highly oxygenated as it leaves the plant since the Harpeth River is effluent dominated at this point. By the next HRWA site downstream from the Lynwood STP, the average DO concentration was below 5 mg/L and the minimum was near 3 mg/L. Three HRWA sites downstream from the Lynwood STP had minimum DO readings around 3 mg/L, including the site at RM 35.3 in Kingston Springs in Cheatham County upstream from the confluence of Turnbull Creek. Only the site downstream of Lynwood (Site 6) measured an overall average below 5 mg/L, while the other sites measured averages between 5 mg/L and 6 mg/L. The only two sites that did not record any concentrations below the state standard of 5 mg/L during the field study were the TDEC site in the Narrows (RM 28.5) and the HRWA site at RM 81.3 (four miles downstream from the Franklin POTW discharge).

Because two sites were done by the same volunteer, this study measured DO concentrations just upstream from the Franklin STP discharge (Site 3 at the Franklin Road bridge), and then just downstream (Site 4) 0.9 river mile within 30 minutes of each other. Site 3 concentrations between 1.6 mg/L and 2.6 mg/L occurred when river flows were between 2.8 and 6.5 cfs. These field data provide more data that river flows in downtown Franklin are not meeting DO standards and are severely below standard before the Franklin STP discharge. Site 3.5 was downstream from Site 3 but still upstream from the Franklin STP. DO concentrations were between 1.2 mg/L and 3 mg/L and measured 10 days after the data collected at Site 3, when river flows were between 6 and 12 cfs. These flows are above the cutoff water withdrawal regime proposal and data found that DO concentrations are not at state standards before the river receives the treated effluent discharges.

Figure 2 – Low-head dam across mainstem in Franklin for drinking water withdrawal, RM 88.1.

Right upstream from this 7-foot low head dam is the City of Franklin 2 MGD drinking water plant withdrawal. The combination of the withdrawals and the low head dam will stop river flows into downtown Franklin. Six such days in October to early November 2005 were also photographed by CTE and included in their Technical memo[8]. The actual withdrawal rate is unknown since the city does not record it. According to two different city consultant reports, the pump is rated 5600 gpm (7 mgd or 10.8 cfs). The plant operator said the pump is running more likely at 3700 gpm (4.6 mgd or 7 cfs). The pump is on most of the time to fill the reservoir from which the plant is supplied with water.

The USGS gage at Franklin (03432350) is 0.9 RM downstream. Two small tributaries enter the river just downstream of the low head dam. Observations this fall by HRWA found different gage readings when the river was not flowing over the dam: 17 cfs (5:30pm coinciding with the photo above on Oct. 25, 2006), and readings that ranged from 7.6 cfs-8.9 cfs between Nov. 3-7, observed water just barely trickling over. The various water withdrawal regimes propose to work from the readings at this gage. The observations this fall clearly indicate that any water withdrawal regime would need a flow gage just upstream to be meaningful for water withdrawal management.

Discussion

The dissolved oxygen data collected over the month of September 2006 by HRWA and TDEC aquatic biologists demonstrate that the mainstem of the Harpeth River from the headwaters to the Bellevue area in Davidson County, over 40 miles downstream from the first sewage treatment plant discharge has significant DO problems (see Appendix E--TDEC Diurnal DO Data for 2002 and 2003). Dissolved oxygen is critical for biological health and is influenced by many factors, including but not limited to water temperature, flow, organic inputs, stream alteration, biological activity, and human activities. The current regulatory water quality standard for DO is 5 mg/L at all times. Much of the DO data collected in this study demonstrates the river is in violation of the current DO standard from the headwaters down to around the Narrows of the Harpeth, over 100 river miles. EPA, during its field study in 2000 for the TDML, measured DO concentrations below the state standards at all its mainstem river sites. The lowest measurements were at RM 114.6 and RM 106.5 (McDaniel Road crossing) in the headwaters and 40 miles downstream at Highway 100 (2.92 mg/L)[1].

The 2006 field data indicates similar conditions found by HRWA in 2002 (see Appendix F) and TDEC in 2002 and 2003, as shown in the figures in Appendix E. TDEC did not gather data upstream from the Franklin water withdrawal during these three sampling periods. The TDEC site at the Franklin Road bridge (RM 87.7) measured DO concentrations below 1 mg/L similar to the data from HRWA Site 3 in 2006. The TDEC site at Cotton Road bridge (RM 79.8) measured DO concentrations below 1 mg/L and for days stayed below 5 mg/L during two sampling occasions (September, 2002 and August, 2003). This is compared to the HRWA Site 6 that measured no DO concentrations below 5 mg/L even though it is only 1.5 river miles upstream from the Cotton Road Bridge. The company CTE, who has conducted analyses as the city of Franklin's consultant submitting the permit application for the drinking water expansion, also recorded DO concentrations that ranged from 2.7 mg/L to 11.7 mg/L along 6 sites between the low head dam and the Franklin STP discharge[8].

These severely low DO concentrations in the downtown Franklin section of the Harpeth downstream from the low head dam make it important to address the effect of the current water withdrawal practices that are affecting the river's reaeration ability when the flows are stopped behind the dam and the river has to create new surface water flow from groundwater and small tributaries (see Figure 2). Currently, all mainstem flow in the Harpeth River goes to zero cfs due to the water withdrawal practices by the Franklin drinking water plant. This would also likely increase the role of SOD in the downtown Franklin section of the Harpeth from these small tributaries that drain the older part of the city that has few stormwater controls.

With the measured low DO concentrations in downtown Franklin upstream from the city STP discharge and downstream from the current drinking water withdrawal, removing water removes oxygen needed during this season to enable the river to assimilate the point source dischargers. Separate analyses were conducted by AquAeTer in 2006 on behalf of HRWA that reviewed the EPA TMDL model predictions along with the field data to determine the effects of withdrawing water on the dissolved oxygen concentrations in the River and the effect on wastewater assimilation as part of a total water balance. For example, a mass balance calculation shows that 99.6 cfs of river water is needed with a D.O. of 6 mg/L to accommodate the full discharge capacity of the Franklin STP and still have 5 mg/L of DO in the river after receiving the discharge[9]. (If the river water is only 5 mg/L, the flow needed is 147.5 cfs). These calculations did not incorporate DO additions from algal production or re-aeration and did not incorporate sediment oxygen demand.

AquAeTer's work also emphasized the dominating role of effluent discharges into the river during these low flow, high temperature conditions . According to the these analyses, river flows during the times of the EPA 2002 and 2003 DO field surveys were on average 29% effluent downstream from Franklin and climbed as high as 73% at times even though the city of Franklin's STP at the time was only at half capacity[10, 11]. For example, TDEC in 2003 (between July 24-August 8) documented D.O. concentrations near zero for one 12-hour period at its station downstream from the Franklin POTW when the river flow was 22-100 cfs during the two-week sampling period. Similar extremely low D.O. concentrations were recorded at the other three stations and D.O. readings did not rise up to around 5 mg/L until a 100 cfs rain event occurred (Append in E)[10].

A small fish kill was reported to HRWA, TDEC and TWRA on August 22, 2003 just three weeks after TDEC's sampling period that year (July 24-August 8- see Appendix E). Beginning in the morning, small rafts of 10-15 dead fish were reported going by a location at 1191 Sneed Road just a river mile or two downstream from the Moran Road crossing (RM 65.9) and last STP discharger in Williamson County. The report included foam the size of sofas as well. HRWA staff collected some of the dead fish. The flow in the river on the USGS gage on August 22 was just over 5 cfs at Franklin and 15 -22 cfs at the Hillsboro Road bridge USGS gage just downstream from the Franklin POTW.

In Aquaeter reports are recommendations for further field data needed to make the EPA's WASP 6 river models useful as predictors of management options that would eliminate the low dissolved oxygen problems [10, 11]. Key elements are already in place, such as the city of Franklin's effluent reuse program which reduces some of the effluent discharge and reduces drinking water demand for irrigation. There is also opportunity for developing cost effective options since the largest discharger in the entire Harpeth river system, Franklin, is only at half capacity. Meanwhile, HRWA has developed a community based headwaters restoration plan in Eagleville with state 319 grant funds to improve water quality in the river before it reaches Franklin and the sewage treatment plants. (Contact the HRWA office for a draft copy of the Headwaters Enhancement Plan and headwaters study).

Acknowledgements

Foremost HRWA wishes to thank the dedicated volunteers identified in Table 1 for their dedication to obtaining data at all times of day and night. This study would have been impossible without their dedication. HRWA would also like to thank James Smith, aquatic biologist with TDEC for coordinating his schedule to gather data with TDEC's equipment to bracket the volunteers' sites. Also, many thanks to Mike Corn, of AquAeTer, who as a member of the HRWA Board, has donated a considerable amount of time to work with HRWA on the critical issue of addressing the river's low flow season's water quality problems. Mike Corn provided review to this report. Considerable thanks go to World Wildlife Fund and Patagonia for their support and funding of this project. We would also like to thank HRWA's members and donors whose general support is vital to enabling HRWA to conduct field studies and complex analyses as part of its overall mission to protect the ecological health of the Harpeth River watershed and provide expertise to state conservation policy.

End Notes

1. *Final Organic Enrichment/Low Dissolved Oxygen Total Maximum Daily Load (TMDL) for Waters in the Harpeth River Watershed (HUC05130204)*, 2004. United States Environmental Protection Agency, Region 4, Sam Nunn Atlanta Federal Center, 61 Forsyth Street, SW, Atlanta, GA 30303-8960.

2. *Harpeth River Below Franklin Dissolved Oxygen Study*; Barry Sulkin; May 1987; Thesis for Vanderbilt University Environmental and Water Resources Engineering.

3. Michaud, J.P. 1991. *A Citizen's Guide to Understanding and Monitoring Lakes and Streams.* Publication. #94-149. Washington State Department of Ecology, Publications Office, Olympia, Washington.

4. *Sediment Oxygen Demand Studies*, United States Environmental Protection Agency, Office of Environmental Measurement and Evaluation, http://www.epa.gov/region1/lab/ecology/sod.html.

5. *Biochemical Oxygen Demand*, Department of Environmental Quality, Michigan.gov http://www.deq.state.mi.us/documents/deq-swq-npdes-BiochemicalOxygenDemand.pdf

6. Merritts, D., DeWet, A., Menking, K., 1998; *Environmental Geology: An Earth System Science Approach.* W.H. Freeman and Company. New York, NY.

7. *Fish and Macroinvertebrate Surveys, Harpeth River, City of Franklin, Williamson County, Tennessee*, 2006; Pennington & Associates, Inc., P.O. Box 2887, 570 East 10th Street, Cookeville, Tennessee 38501-2887

8. *Technical Memorandum-DRAFT: Harpeth River Water Availability Study*; June 2006; CTE 220 Athens Way, Suite 220, Nashville, TN 37228; for City of Franklin.

9. *Analysis of the Harpeth River Dissolved Oxygen Demands Downstream from the Franklin POTW*, November 2006. John Michael Corn, E.I.T. and Michael Corn, P.E., AquAeTer, 215 Jamestown Park, Suite, 100, Brentwood, TN 37027, prepared for Harpeth River Watershed Association.

10. *Water Quality Analysis: Harpeth River Between Franklin and Kingston Springs Tennessee*, September 2006; John Michael Corn, E.I.T. and Michael Corn, P.E., AquAeTer, 215 Jamestown Park, Suite, 100, Brentwood, TN 37027, prepared for Harpeth River Watershed Association.

11. *Presentation to City of Franklin: Analysis of the Harpeth River for Water Withdrawals and Wastewater Assimilative Capacity*; October 2006; Prepared by HRWA (Dorene Bolze), and John Michael Corn, E.I.T. and Michael Corn, P.E. (AquAeTer, 215 Jamestown Park, Suite, 100, Brentwood, TN 37027).

Additional References

2004; *Final Version Year 2002 303(d) List.* Tennessee Department of Environment and Conservation, Division of Water Pollution Control, 6th Floor, L & C Annex, 401 Church Street Nashville, Tennessee 37243-1534.

2005; *Final Version Year 2004 303(d) List.* Tennessee Department of Environment and Conservation, Division of Water Pollution Control, 6th Floor, L & C Annex, 401 Church Street Nashville, Tennessee 37243-1534.

2006; *Proposed Final Version Year 2006 303(d) List.* Tennessee Department of Environment and Conservation, Division of Water Pollution Control, 6th Floor, L & C Annex, 401 Church Street Nashville, Tennessee 37243-1534.

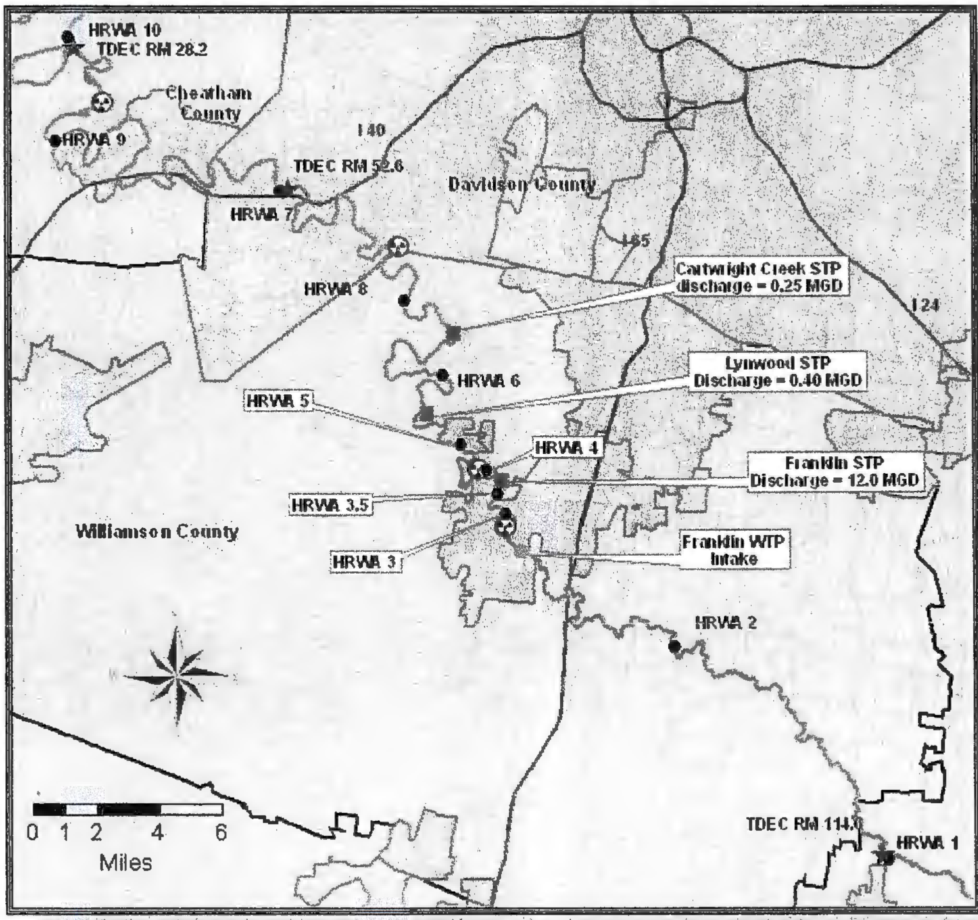
Evaluation of Regional Dissolved Oxygen Patterns of Wadeable Streams in Tennessee Based on Diurnal and Daylight Monitoring, Tennessee Department of Environment and Conservation, Division of Water Pollution Control, 7th Floor L&C Annex, 401 Church Street, Nashville, Tennessee 37243.

Harpeth River Assimilative Capacity at Lynwood STP; Barry Sulkin; November 1998.

Wilson, David J., 2002; *Harpeth River Main Stem Dissolved Oxygen Study.* Harpeth River Watershed Association, Franklin, Tennessee. See Appendix F.

Appendix A – Site Maps

HRWA & TDEC Dissolved Oxygen Sampling Sites 2006



Overview of HRWA & TDEC Sampling Sites

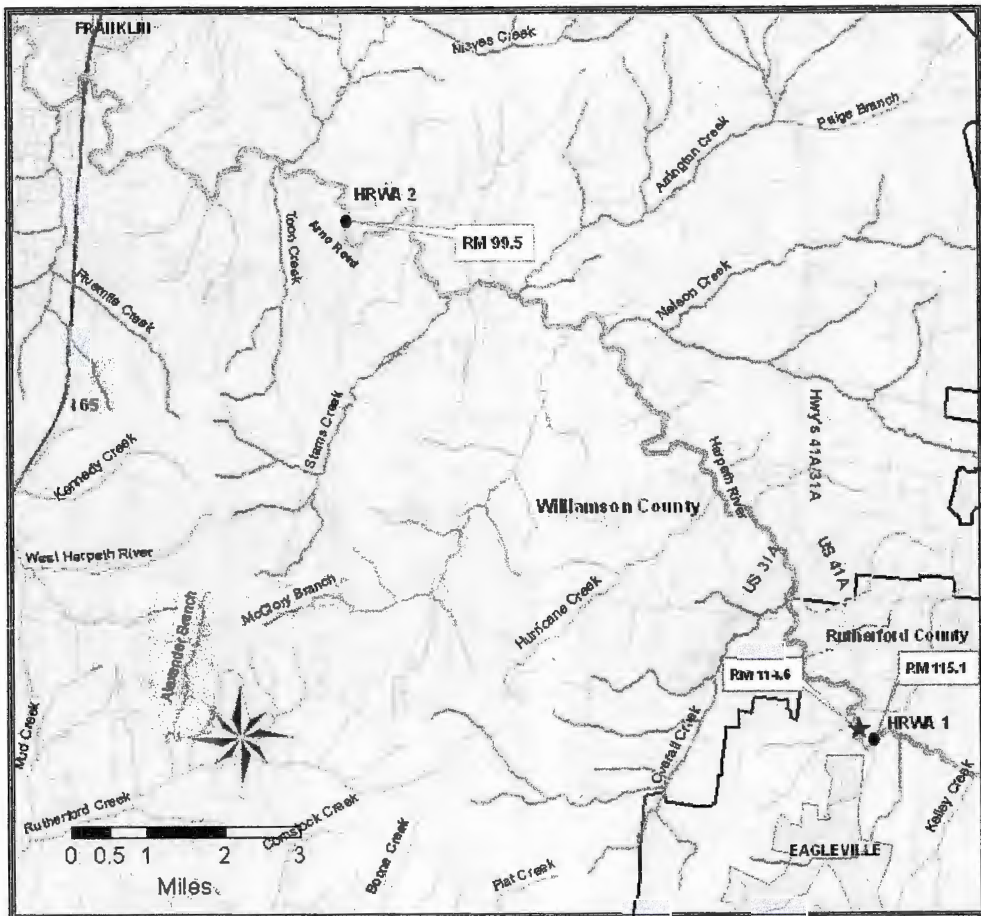
Detail Maps

Map 1 Eagleville Area
Map 2 Franklin Area
Map 3 North Williamson county
Map 4 Bellevue Area
Map 5 Kingston Springs Area

Legend

- TDEC Sites
- HRWA Sites
- Franklin WTP Intake
- Sewer Treatment Plants
- USGS Gages

HRWA & TDEC Dissolved Oxygen Sampling Sites 2006



Map 1 Eagleville Area

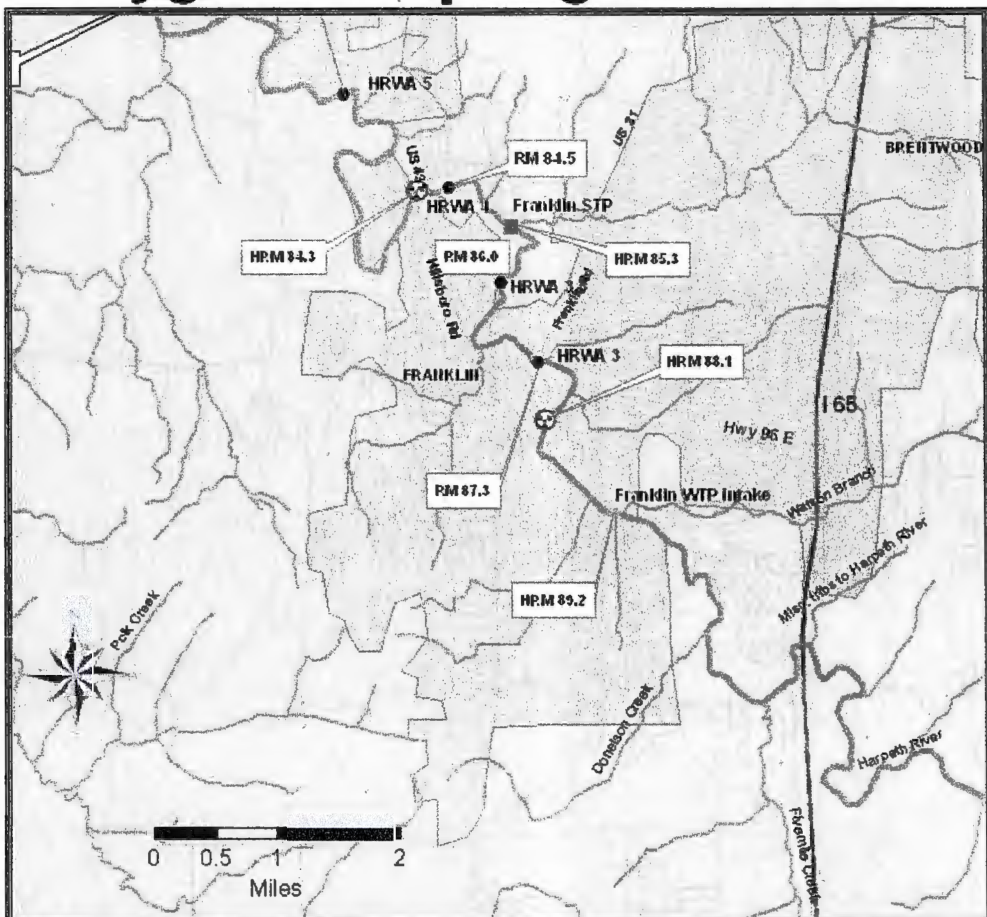
HRWA & TDEC Sampling Sites

HRWA 1 off Hwy 41A north of Eagleville
TDEC RM 114.6 below bridge at Hwy 41A, Eagleville
HRWA 2 Trinity Road near Arno Road

Legend

- ● HRWA Sites
- ★ TDEC Sites
- Urban Areas
- Harpeth River
- Rutherford roads

HRWA & TDEC Dissolved Oxygen Sampling Sites 2006



Map 2 Franklin Area

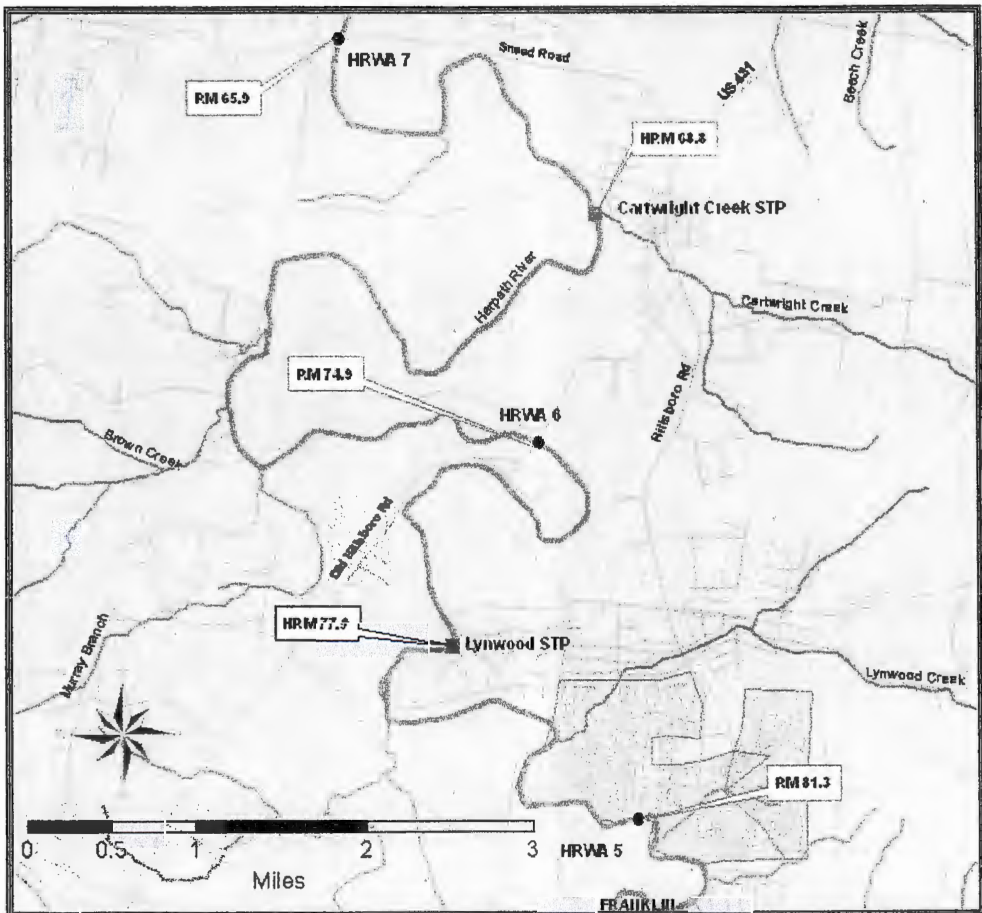
HRWA & TDEC Sampling Sites

HRWA 3	below Hwy 31 bridge in Franklin
HRWA 3.5	next to Chestnut Bend Subdivision
HRWA 4	1/4 mile east of Hwy 431 bridge

Legend

- ● HRWA Sites
- ★ TDEC Sites
- Franklin WTP Intake
- ■ Sewer Treatment Plants
- USGS Gages
- Urban Areas

HRWA & TDEC Dissolved Oxygen Sampling Sites 2006



Map 3 North Williamson County

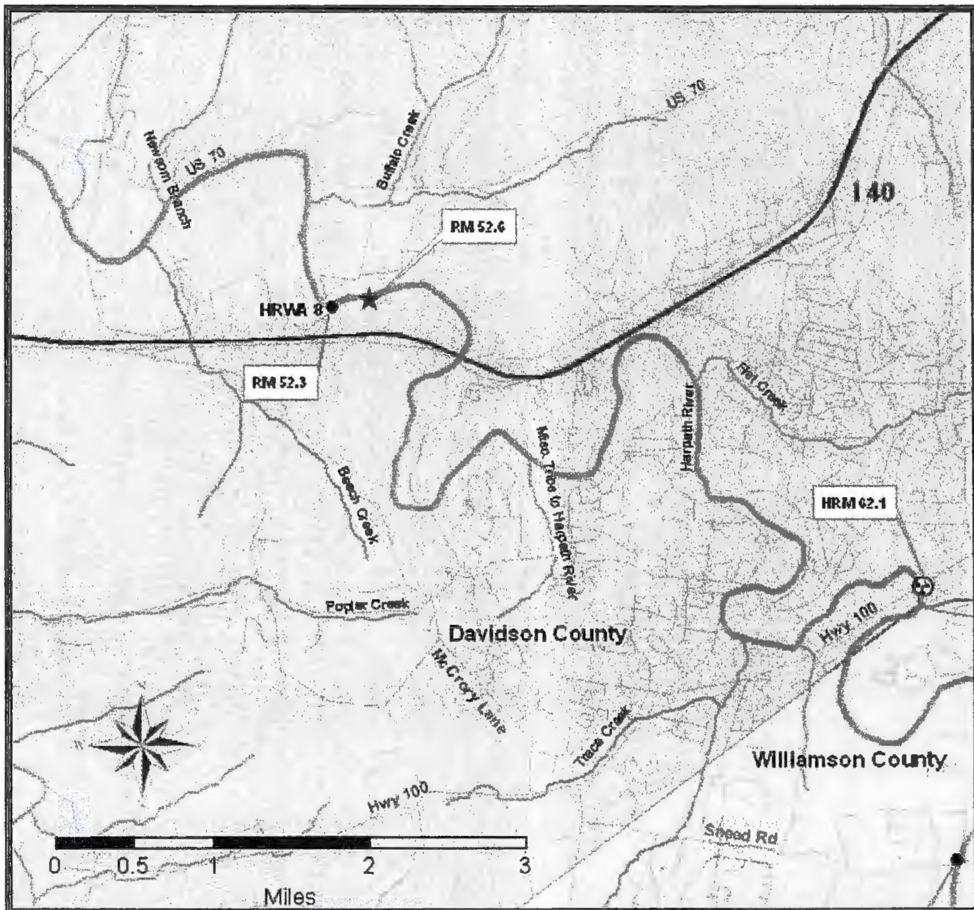
HRWA & TDEC Sampling Sites

HRWA 5	behind Fieldstone Farms
HRWA 6	below Old Hillsboro Pike
HRWA 7	below bridge at Sneed Road

Legend

- ● HRWA Sites
- ★ TDEC Sites
- Urban Areas
- Franklin WTP Intake
- Sewage Treatment Plants

HRWA & TDEC Dissolved Oxygen Sampling Sites 2006



Map 4 Bellevue Area

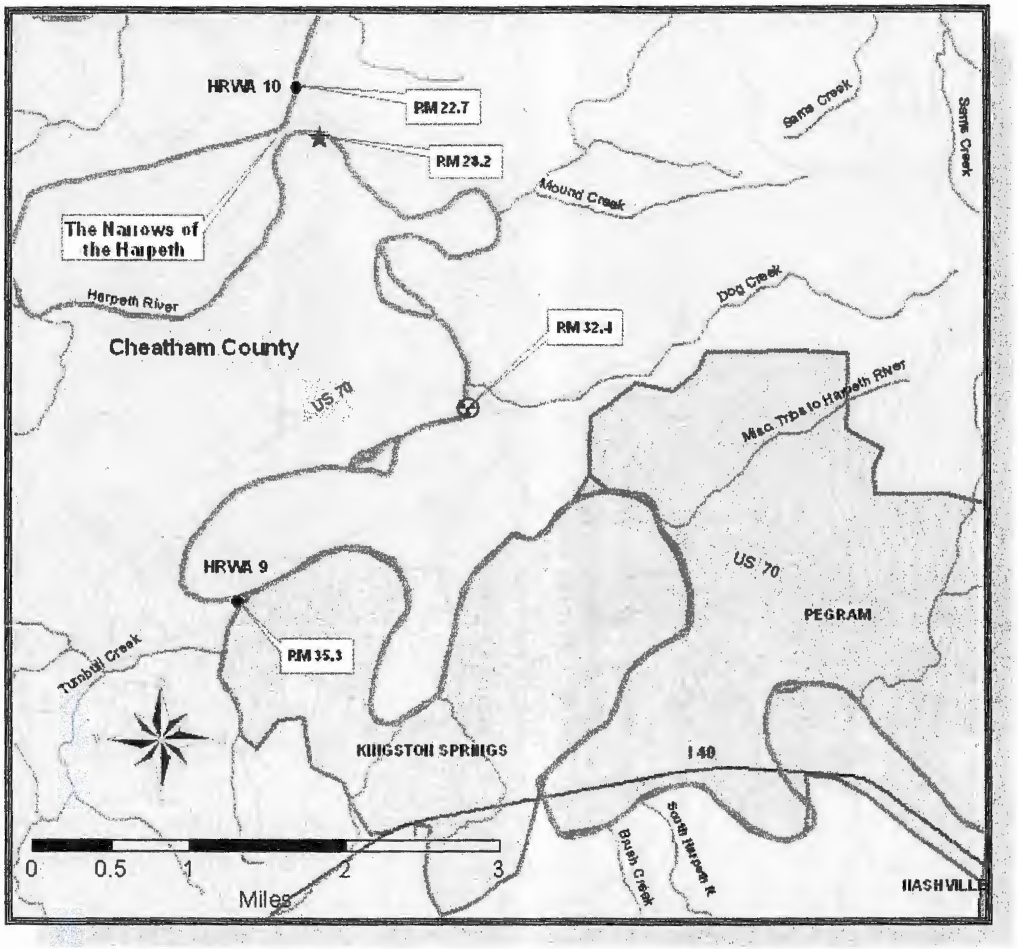
HRWA & TDEC Sampling Sites

HRWA 8	**Newsom's Mill**
TDEC RM 52.3	**upstream of Newsom's Mill**

Legend

- HRWA Sites
- TDEC Sites
- USGS Gages
- Urban Areas

HRWA & TDEC Dissolved Oxygen Sampling Sites 2006



Map 5 Kingston Springs Area

HRWA & TDEC Sampling Sites

HRWA 9	just upstream of Turnbull Creek
TDEC RM 28.2	upstream of canoe ramp.The Narrows
HRWA 10	canoe take out. The Narrows gravel bar

Legend

- ● HRWA Sites
- ★ TDEC Sites
- USGS Gages
- Urban Areas

Appendix B – US Geological Service Flow Data

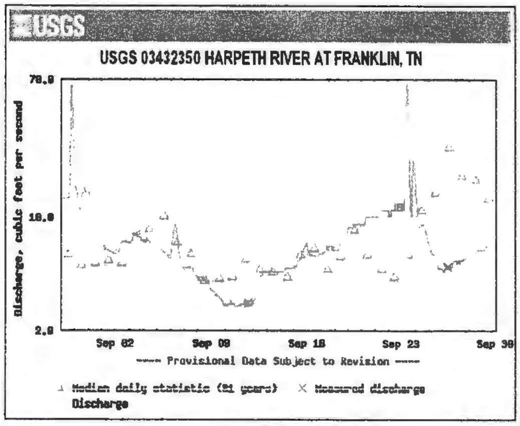


Figure 3: RM 88.1

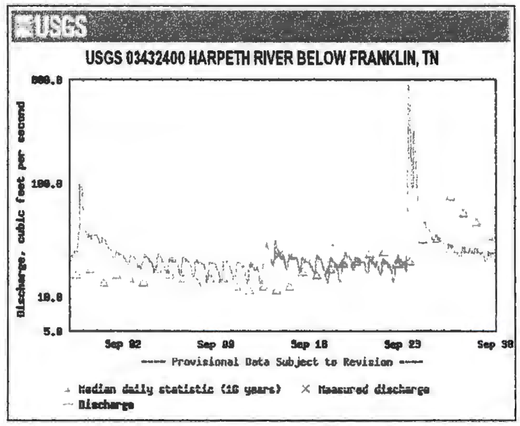


Figure 4: RM 84.3

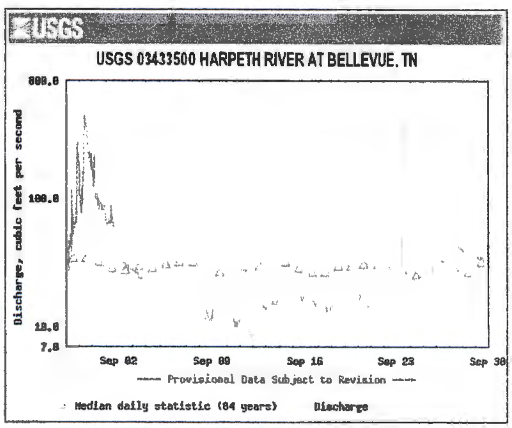


Figure 5: RM 62.1

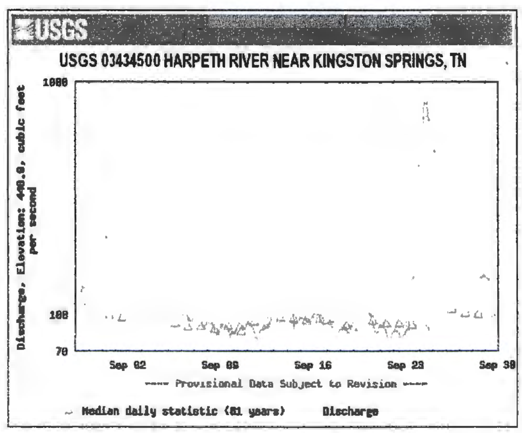
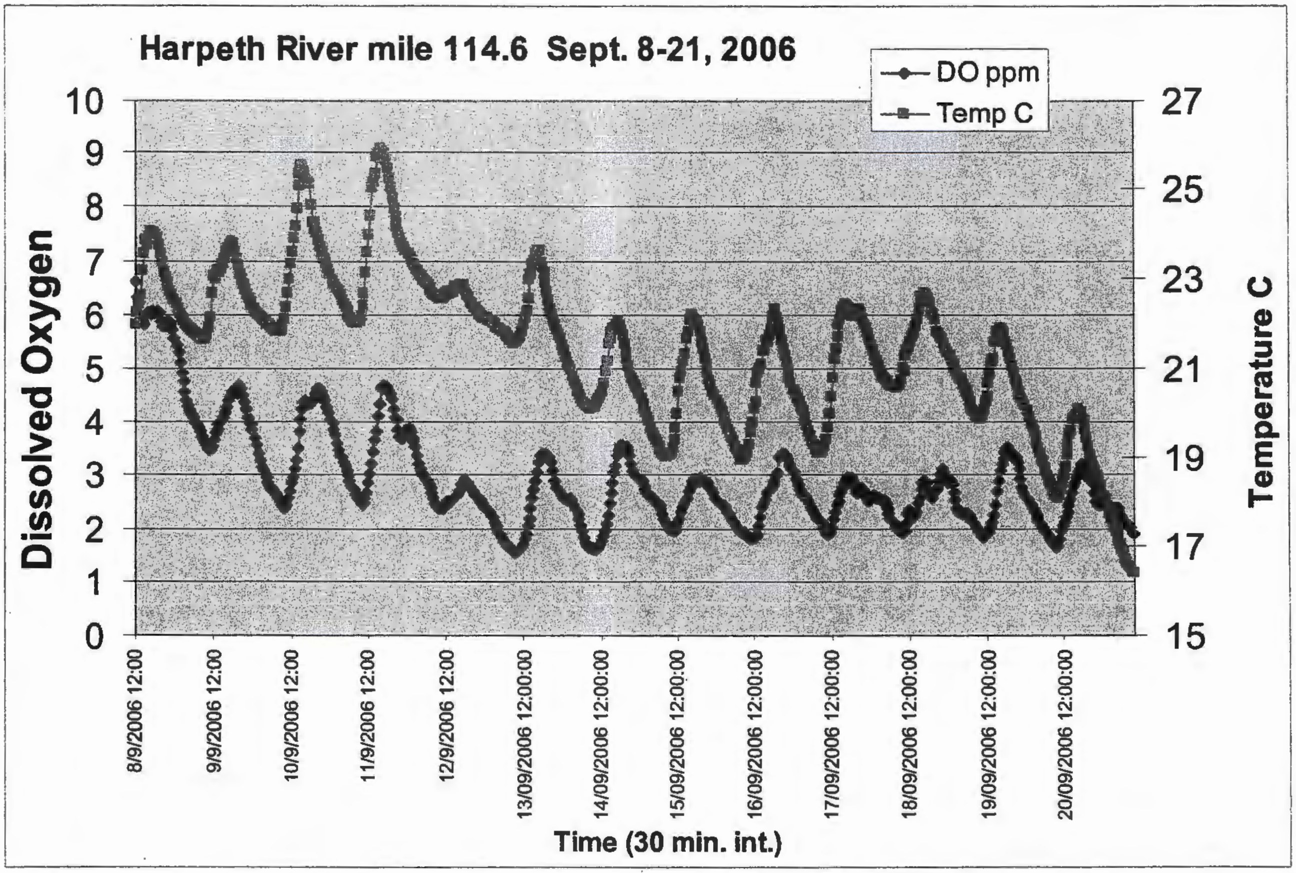


Figure 6: RM 32.4

Appendix C –
TDEC 2006 Dissolved Oxygen Diurnal Graphs

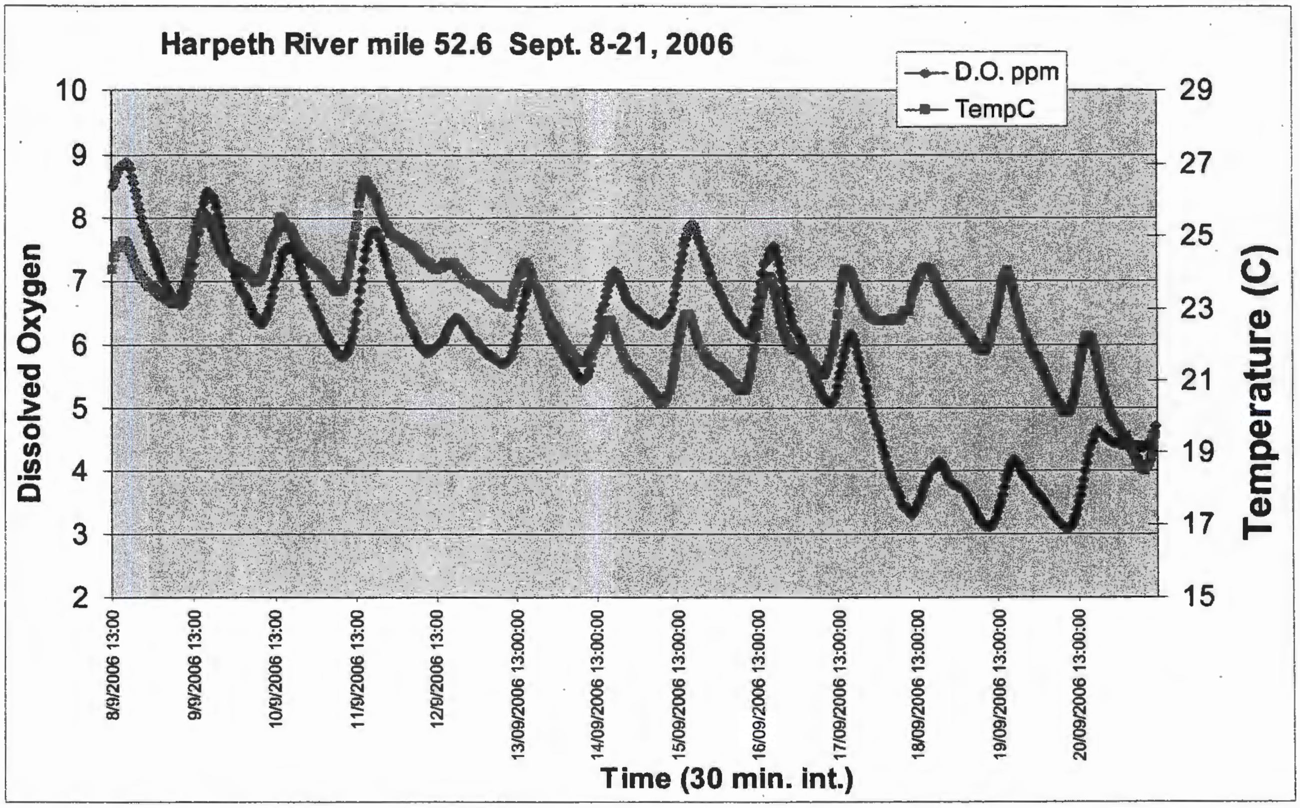
Eagleville, Route 41A and Webb Road Crossing



Percent Saturation:

9/8/2006 (10:30am): 48%. D.O. 4.2 ppm @ 21.1°C.
9/21/2006 (10:15am): 26%. D.O. 2.5 ppm @ 16.4°C.

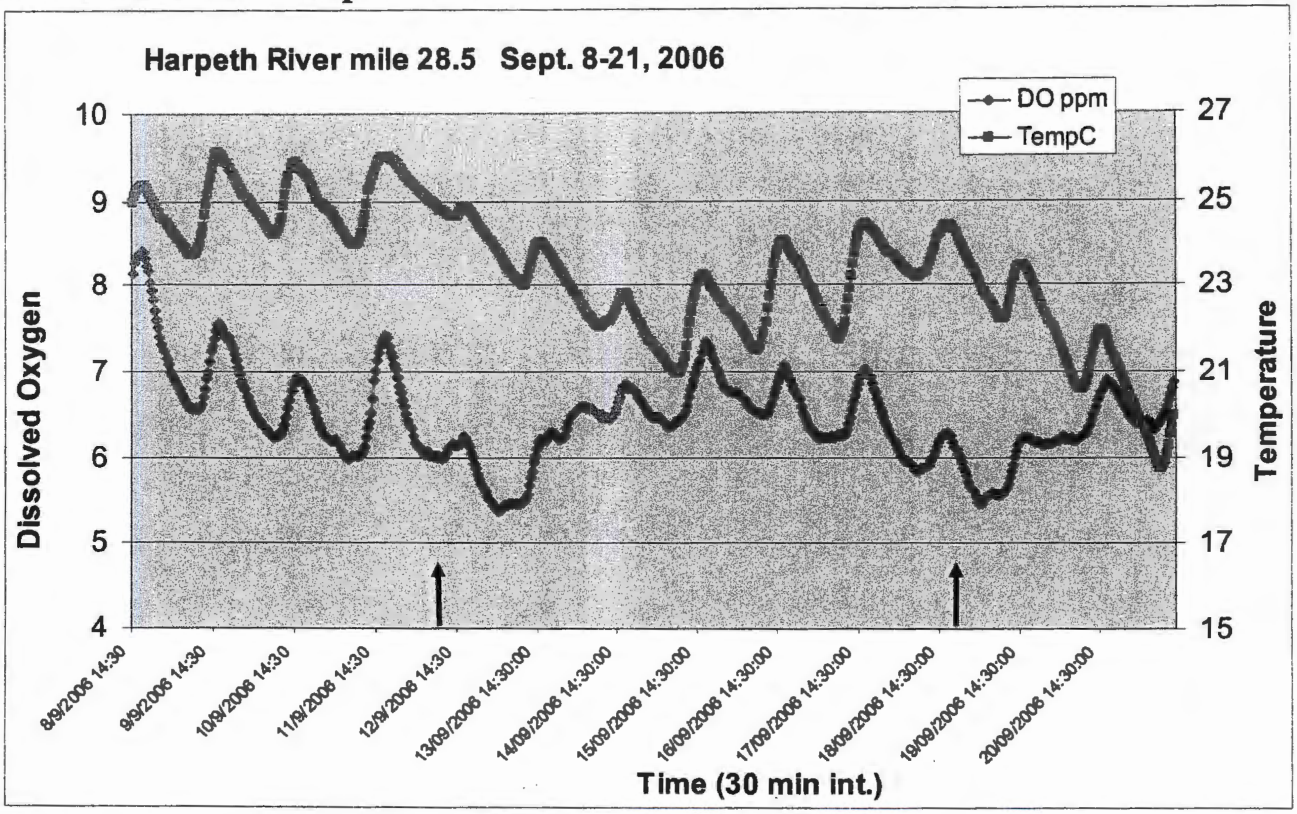
Newsom Mill, Bellevue (Davidson County)



Percent Saturation:

9/8/2006 (12:45pm): 89%. D.O. 7.4 ppm @ 24.0 °C.
9/21/2006 (12:45pm): 89% D.O. 8.0 ppm @20.0°C .

Narrows of the Harpeth downstream of canoe take out, Cheatham County



TDEC initial and final calibrations off by 20% for this site, according to email from James Smith provided the data to HRWA.

Percent Saturation:

9/8/2006 (14:00): 94%. D.O. 7.7ppm@24.9°C.
9/21/2006 (13.30): 92%. D.O. 8.2ppm@20.4°C .

Harpeth River Discrete Sampling 2006
TDEC Water Pollution Control - Nashville Field Office

Site	River Mile	Date	Time	Temp (C)	D.O. (ppm)	Flow (cfs)
off Beech Hill Rd	45.0	7/27/06	13:20	30.15	7.55	34.38
		8/29/06	13:35	29.07	8.16	33.2
		9/28/06	14:05	21.34	8.41	68.02
Hwy 100	63.3	7/31/06	9:00	26.13	n/a	100
		8/30/06	8:35	26.08	5.70	200
		9/12/06	9:30	23.49	7.57	16.6
Cotton Rd	79.8	8/2/06	13:20	27.81	5.21	28.09
		8/7/06	13:20	27.35	n/a	25.83
		8/16/06	13:20	25.42	5.93	24.21
		8/17/06	13:30	25.65	5.71	n/a
		8/21/06	13:30	26.60	5.40	19.77
		8/24/06	13:20	24.43	6.06	29.45
		8/28/06	13:30	26.67	n/a	17.84
under I-65	92.4	8/2/06	12:15	28.84	5.09	6.71
		8/7/06	12:00	28.07	n/a	8.05
		8/16/06	12:45	26.32	5.96	8.48
		8/17/06	12:30	26.79	5.53	n/a
		8/21/06	12:20	27.49	5.09	2.78
		8/24/06	11:50	25.11	5.99	7.34
		8/28/06	12:15	27.21	n/a	2.85
Lampkins Bridge Rd	103.0	7/18/06	9:25	26.74	5.27	n/a
		8/3/06	9:05	27.38	3.91	1.33
		9/19/06	9:30	20.01	4.89	n/a
McDaniels Rd	106.4	7/18/06	9:55	25.69	4.70	0.67
		8/3/2006	9:45	26.16	3.99	0.96
		9/19/2006	10:00	18.94	2.94	0.20

Appendix D – HRWA Dissolved Oxygen Raw Data

HRWA DO Raw Data, September 2006 revised 10-16-06

Site 1 East of Hwy 41 on River Rd, just north of Eaglevil						**Site 2** Trinity Rd approx 1/4 mile from Arno Rd					
Latitude			Longitude			Latitude			Longitude		
35	45	49	86	38	34	35	51	51	86	46	4
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
7-Sep	6:15 a.m.	18	1.8	no data	20.93	28-Sep	6:15	18.6	3.2	no data	37.67
	6:25 a.m.	18	1.8	no data	20.93		6:30	18.6	3.25	no data	38.26
	6:33 a.m.	18	1.9	no data	22.10		6:45	18.6	3.2	no data	37.67
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
7-Sep	12:15 p.m.	20.5	1.8	no data	22.02	28-Sep	11:15	18.6	3.4	no data	40.03
	12:26 p.m.	21.5	1.9	no data	23.71		11:28	18.6	3.6	no data	42.38
	12:40 p.m.	20.5	2.1	no data	25.69		11:43	18.6	3.4	no data	40.03
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
7-Sep	6:15 p.m.	22	1.8	no data	22.69	28-Sep	17:42	18.2	4.8	no data	56.05
	6:35 p.m.	22	3.4	no data	42.86		17:56	18.2	4.4	no data	51.38
	7 p.m.	22	3.0	no data	37.81		18:10	18.2	3.8	no data	44.37
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
8-Sep	12 a.m.	21.5	1.7	no data	21.22	28-Sep	23:00	18.3	4.1	no data	47.98
	12 a.m.	21.5	1.8	no data	22.47		23:09	18.3	4.3	no data	50.32
	12 a.m.	21.5	1.8	no data	22.47		23:20	18.3	3.9	no data	45.63
	Averages	20.58	2.07		25.33		Averages	18.43	3.78		44.33
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
11-Sep	6:08 a.m.	21	1.6	no data	19.77	30-Sep	5:15	17.5	2.4	no data	27.62
	6:20 a.m.	21	1.6	no data	19.77		5:31	17.5	2.2	no data	25.32
	6:33 a.m.	21	1.5	no data	18.54		5:50	17.5	2.0	no data	23.02
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
11-Sep	12:00 p.m.	22	1.7	no data	21.43	30-Sep	11:28	18	2.8	no data	32.56
	12:18 p.m.	22	1.6	no data	20.17		11:40	18	3.1	no data	36.05
	12:33 p.m.	22	1.6	no data	20.17		11:53	18	3.8	no data	44.19
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
10-Sep	5:50 p.m.	23	1.3	no data	16.71	30-Sep	17:20	18	3.8	no data	44.19
	6:14 p.m.	23	1.4	no data	18.00		17:32	18	4.0	no data	46.52
	6:23 p.m.	23	1.6	no data	20.57		17:43	18	4.1	no data	47.68
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
11-Sep	12:05 a.m.	22.5	1.5	no data	19.09	30-Sep	22:59	17.5	4.1	no data	47.19
	12:20 a.m.	22.5	1.6	no data	20.37		23:12	17.5	4.0	no data	46.04
	12:30 a.m.	22.5	1.6	no data	20.37		23:20	17.5	3.8	no data	43.74
	Averages	22.13	1.55		19.59		Averages	17.75	3.34		38.66
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
15-Sep	6:05 a.m.	20.5	1.5	no data	18.35	1-Oct	5:50	17.5	3.90	no data	44.89
	6:18 a.m	20.5	1.6	no data	19.58		6:02	17.5	4.2	no data	48.34
	6:30 a.m.	20.5	1.6	no data	19.58		6:15	17.5	4.10	no data	47.19
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
15-Sep	12:10 p.m.	21	1.7	no data	21.01	1-Oct	11:40	17.5	3.80	no data	43.74
	12:25 p.m.	21	1.8	no data	22.24		11:53	17.5	3.60	no data	41.44
	12:40 p.m.	21	1.7	no data	21.01		12:02	17.5	3.90	no data	44.89
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
15-Sep	6:05 p.m.	21	1.8	no data	22.24	1-Oct	17:30	22	2.30	no data	28.99
	6:20 p.m.	21	1.8	no data	22.24		17:45	22	2.90	no data	36.55
	6:37 p.m.	21	1.8	no data	22.24		17:57	22	3.00	no data	37.81
date	**time**	**temp**	**do**	**flow**	**% Sat.**	**date**	**time**	**temp**	**do**	**flow**	**% Sat.**
15-Sep	12a.m.	21	1.7	no data	21.01	1-Oct	23:20	19.9	3.10	no data	37.47
	12:15 a.m.	21	1.7	no data	21.01		23:32	19.9	3.40	no data	41.10
	12:25 a.m.	21	1.6	no data	19.77		23:46	19.9	3.20	no data	38.68
	Averages	20.88	1.69		20.85		Averages	19.23	3.45		41.14

% saturation is based on an average altitude above sea level of 550 feet

99.299 kpa @ 550 ft above sea level (formula from http://waterontheweb.org/under/waterquality/oxygen.html)

Site 3 under Hwy 31 bridge on north side of Franklin

Latitude			Longitude		
35	55	39	86	51	57
date	**time**	**temp**	**do**	**flow**	**% Sat.**
10-Sep	4:22	23.5	2.3	2.8	29.86
	4:34	23.5	2.2	2.8	28.56
	4:43	23.5	2.3	2.8	29.86
date	**time**	**temp**	**do**	**flow**	**% Sat.**
10-Sep	10:00	25	2.4	2.9	32.07
	10:09	25	2.4	2.9	32.07
	10:20	25	2.6	2.9	34.75
date	**time**	**temp**	**do**	**flow**	**% Sat.**
10-Sep	16:00	27.5	2.4	2.8	33.64
	16:12	27.5	2.4	2.8	33.64
	16:20	27.5	2.6	2.8	36.44
date	**time**	**temp**	**do**	**flow**	**% Sat.**
10-Sep	22:07	25.5	1.8	2.8	24.29
	22:17	25.5	1.9	2.8	25.64
	22:25	25.5	1.8	2.8	24.29
	Averages	25.38	2.26	2.83	30.40
date	**time**	**temp**	**do**	**flow**	**% Sat.**
14-Sep	4:33	18.5	2.1	4.5	24.67
	4:44	18.5	2.4	4.5	28.20
	4:55	18.5	2.2	4.5	25.85
date	**time**	**temp**	**do**	**flow**	**% Sat.**
14-Sep	10:05	19	2.2	4.8	26.11
	10:13	19	2.4	4.8	28.49
	10:24	19	2.2	4.8	26.11
date	**time**	**temp**	**do**	**flow**	**% Sat.**
14-Sep	16:28	20.5	2.4	4.8	29.36
	16:36	20.5	2.4	4.8	29.36
	16:44	20.5	2.5	4.8	30.59
date	**time**	**temp**	**do**	**flow**	**% Sat.**
14-Sep	22:08	18.5	2.0	4.8	23.50
	22:15	18.5	1.9	4.8	22.32
	22:24	18.5	2.0	4.8	23.50
	Averages	19.13	2.23	4.73	26.48
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	4:10	19.5	2.4	6.0	28.78
	4:18	19.5	2.3	6.0	27.58
	4:30	19.5	2.4	6.0	28.78
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	10:05	21.5	2.4	6.2	29.95
	10:13	21.5	2.2	6.2	27.46
	10:22	21.5	2.3	6.2	28.71
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	16:01	25.5	2.4	6.5	32.38
	16:08	25.5	2.0	6.5	26.99
	16:17	25.5	2.2	6.5	29.68
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	10:00	23	1.8	6.2	23.14
	10:07	23	1.6	6.2	20.57
	10:15	23	1.8	6.2	23.14
	Averages	22.38	2.15	6.23	27.30

Note:flow data from USGS gage at Franklin

Note:*daily average, cubic feet per second from closest USGS gage

Site 3.5 Chestnut Bend Subdivision

Latitude			Longitude		
35	56	13	86	52	13
date	**time**	**temp**	**do**	**flow**	**% Sat.**
20-Sep	500	15	1.40	8.9	15.29
	607	15	1.20	8.9	13.11
	614	15	1.40	8.9	15.29
date	**time**	**temp**	**do**	**flow**	**% Sat.**
20-Sep	1150	18.5	2.00	10.0	23.50
	1201	18.5	1.80	10.0	21.15
	1211	18.5	2.10	10.0	24.67
date	**time**	**temp**	**do**	**flow**	**% Sat.**
20-Sep	1740	19	2.50	10.0	29.67
	1757	19	2.30	10.0	27.30
	1811	19	2.40	10.0	28.49
date	**time**	**temp**	**do**	**flow**	**% Sat.**
20-Sep	2313	18.5	1.50	10.0	17.62
	2326	18.5	1.40	10.0	16.45
	2343	18.5	1.40	10.0	16.45
	Averages	17.75	1.78	9.73	20.63
date	**time**	**temp**	**do**	**flow**	**% Sat.**
22-Sep	546	18	1.50	10.0	17.44
	558	18	1.50	10.0	17.44
	607	18	1.80	10.0	20.93
date	**time**	**temp**	**do**	**flow**	**% Sat.**
22-Sep	1159	19	1.70	11.0	20.18
	1209	19	1.70	11.0	20.18
	1217	19	1.90	11.0	22.55
date	**time**	**temp**	**do**	**flow**	**% Sat.**
22-Sep	1745	22	2.20	12.0	27.73
	1755	22	2.30	12.0	28.99
	1810	22	2.00	12.0	25.21
date	**time**	**temp**	**do**	**flow**	**% Sat.**
23-Sep	0:00	23	1.40	11.0	18.00
	0:18	23	1.20	11.0	15.43
	0:28	23	1.20	11.0	15.43
	Averages	20.50	1.70	11.00	20.80
date	**time**	**temp**	**do**	**flow**	**% Sat.**
24-Sep	11:52	22	2.90	8.9	36.55
	12:00	22	3.00	8.9	37.81
	12:09	22	3.00	8.9	37.81
date	**time**	**temp**	**do**	**flow**	**% Sat.**
24-Sep	17:58	21	2.20	8.4	27.19
	18:10	21	2.40	8.4	29.66
	18:18	21	2.30	8.4	28.42
date	**time**	**temp**	**do**	**flow**	**% Sat.**
24-Sep	23:29	20	1.80	7.1	21.80
	23:40	20	1.70	7.1	20.59
	23:52	20	1.80	7.1	21.80
date	**time**	**temp**	**do**	**flow**	**% Sat.**
25-Sep	5:58	18	1.80	6.0	20.93
	6:06	18	1.80	6.0	20.93
	6:13	18	1.70	6.0	19.77
	Averages	20.25	2.20	7.60	26.78

Note:flow data from USGS gage at Franklin

Site 4 1/4 mi east of Hwy 431bridge north of Franklin (across from Rec Cente						**Site 5** behind 7001 Penbrook Dr, Fieldstone Farms					
Latitude			Longitude			Latitude			Longitude		
35	56	54	86	52	37	35	57	36	86	53	29
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
10-Sep	5:14	23.5	4.0	14.0	51.92	9-Sep	5:00	22.5	5.40	18.0	68.74
	5:27	23.5	4.8	14.0	62.31		5:20	22.5	5.80	18.0	73.83
	5:40	23.5	4.3	14.0	55.82		5:30	22	5.80	18.0	73.11
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
10-Sep	10:51	25	3.8	15.0	50.78	9-Sep	11:05	23	6.80	15.0	87.41
	11:03	25	4.7	15.0	62.81		11:15	23	7.00	15.0	89.99
	11:14	25	4.0	15.0	53.46		11:25	23	6.80	15.0	87.41
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
10-Sep	16:49	26.5	5.0	20.0	68.77	9-Sep	17:00	24.5	5.80	16.0	76.77
	16:58	26.5	5.4	20.0	74.27		17:10	24.5	5.90	16.0	78.09
	17:08	26.5	5.5	20.0	75.64		17:20	24.5	6.00	16.0	79.41
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
10-Sep	22:58	26	5.0	18.0	68.11	8-Sep	23:00	24	6.00	21.0	78.65
	23:07	26	5.2	18.0	70.84		23:15	24	6.00	21.0	78.65
	23:19	26	4.8	18.0	65.39		23:23	24	6.10	21.0	79.96
	Averages	25.25	4.71	16.75	63.23		Averages	23.46	6.12	17.50	79.34
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
14-Sep	5:25	18	5.4	18.0	62.80	16-Sep	5:15	20	6.0	21.0	72.67
	5:35	18	5.4	18.0	62.80		5:25	20	6.0	21.0	72.67
	5:45	18	5.3	18.0	61.64		5:35	20	6.1	21.0	73.89
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
14-Sep	10:52	19	5.0	22.0	59.35	16-Sep	11:15	21	6.6	19.0	81.56
	11:00	19	5.4	22.0	64.10		11:25	21	6.6	19.0	81.56
	11:09	19	5.3	22.0	62.91		11:35	21	6.8	19.0	84.03
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
14-Sep	17:10	20.5	6.0	22.0	73.41	15-Sep	17:05	23	7.3	18.0	93.84
	17:20	20.5	6.2	22.0	75.85		17:15	23	7.3	18.0	93.84
	17:30	20.5	6.2	22.0	75.85		17:25	23	7.2	18.0	92.56
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
14-Sep	22:51	18.5	5.8	22.0	68.15	15-Sep	23:00	21	6.8	19.0	84.03
	22:58	18.5	5.7	22.0	66.97		23:10	21	6.6	19.0	81.56
	23:08	18.5	5.9	22.0	69.32		23:20	21	6.6	19.0	81.56
	Averages	19.00	5.63	21.00	66.87		Averages	21.25	6.66	19.25	82.69
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
17-Sep	4:56	20.5	4.7	15.0	57.50	22-Sep	5:20	19	6.1	20.0	72.41
	5:05	20.5	4.5	15.0	55.06		5:30	19	6.2	20.0	73.59
	5:15	20.5	4.6	15.0	56.28		5:40	19	6.2	20.0	73.59
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
17-Sep	10:50	21.5	4.6	16.0	57.41	22-Sep	12:00	19.5	6.6	18.0	79.14
	11:02	21.5	4.5	16.0	56.16		12:10	19.5	6.4	18.0	76.74
	11:11	21.5	4.6	16.0	57.41		12:20	19.5	6.6	18.0	79.14
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
17-Sep	16:44	25	5.9	21.0	78.85	21-Sep	17:20	19	7.7	14.0	91.40
	16:50	25	6.0	21.0	80.18		17:30	19	7.8	14.0	92.58
	17:02	25	6.0	21.0	80.18		17:40	19	7.8	14.0	92.58
date	time	temp	do	flow	% Sat.	date	time	temp	do	flow	% Sat.
17-Sep	22:42	23.5	5.5	19.0	71.40	21-Sep	23:05	19	6.9	20.0	81.90
	22:50	23.5	5.4	19.0	70.10		23:15	19	7.0	20.0	83.09
	23:02	23.5	5.4	19.0	70.10		23:25	19	7.0	20.0	83.09
	Averages	22.63	5.14	17.75	65.61		Averages	19.13	6.86	18.00	81.61

Note:flow data from USGS gage at Franklin (site 0.8 mi upstream)

Note:flow data from USGS gage below Franklin

Site 6 under bridge at Old Hillsboro Pike

Latitude			Longitude		
35	59	35	86	54	9

date	time	temp	do	flow	% Sat.
5-Sep	4:45	22	5.0	17.0	63.02
	5:00	22	5.1	17.0	64.29
	5:15	22.5	5.2	17.0	66.19
date	time	temp	do	flow	% Sat.
5-Sep	10:40	21.5	4.2	21.0	52.42
	11:00	21.5	4.8	21.0	59.91
	11:20	21.5	4.4	21.0	54.92
date	time	temp	do	flow	% Sat.
5-Sep	16:50	23.5	4.8	22.0	62.31
	17:11	23.5	4.8	22.0	62.31
	17:25	23.5	5.0	22.0	64.91
date	time	temp	do	flow	% Sat.
5-Sep	22:45	24	5.2	20.0	68.16
	23:00	24	6.2	20.0	81.27
	23:20	24	5.8	20.0	76.03
	Averages	22.79	5.04	20.00	64.55
date	time	temp	do	flow	
10-Sep	4:30	23.5	6.0	15.0	77.89
	4:42	23.5	6.6	15.0	85.68
	4:52	23.5	4.2	15.0	54.52
date	time	temp	do	flow	% Sat.
10-Sep	10:30	23.5	3.2	15.0	41.54
	10:45	23.5	3.4	15.0	44.14
	10:58	23.5	3.2	15.0	41.54
date	time	temp	do	flow	% Sat.
10-Sep	16:25	24.5	3.2	20.0	42.35
	16:40	24.5	3.6	20.0	47.65
	16:55	24.5	3.6	20.0	47.65
date	time	temp	do	flow	% Sat.
10-Sep	22:24	24	4.8	18.0	62.92
	22:42	24	3.8	18.0	49.81
	22:55	24.5	5.2	18.0	68.83
	Averages	23.92	4.23	17.00	55.40
date	time	temp	do	flow	% Sat.
16-Sep	5:20	20	4.8	17.0	58.14
	5:35	20	4.4	17.0	53.29
	5:50	20	4.4	17.0	53.29
date	time	temp	do	flow	% Sat.
16-Sep	11:50	20.5	5.2	20.0	63.62
	12:10	20.5	4.0	21.0	48.94
	12:25	20.5	5.0	21.0	61.17
date	time	temp	do	flow	% Sat.
16-Sep	17:40	22	4.2	21.0	52.94
	17:57	22	4.8	21.0	60.50
	18:12	22	4.2	21.0	52.94
date	time	temp	do	flow	% Sat.
16-Sep	23:37	22	6.4	19.0	80.67
	23:55	22	6.8	19.0	85.71
17-Sep	0:10	22	5.2	19.0	65.55
	Averages	21.13	4.95	19.42	61.32

Note:flow data from USGS gage below Franklin

Site 7 under bridge at Sneed Rd

Latitude			Longitude		
36	1	43	86	55	27

date	time	temp	do	flow	% Sat.
6-Sep	5:38	22	6.1	21.0	76.89
	5:49	22	6.2	21.0	78.15
	6:05	22	4.8	21.0	60.50
date	time	temp	do	flow	% Sat.
6-Sep	12:53	25.5	6.2	20.0	83.66
	13:00	26	6.0	20.0	81.74
	13:24	27	5.6	20.0	77.76
date	time	temp	do	flow	% Sat.
5-Sep	18:00	24.5	6.4	16.0	84.71
	18:15	24.5	7.9	16.0	104.56
	18:30	24.5	6.9	16.0	91.33
date	time	temp	do	flow	% Sat.
5-Sep	23:29	23.5	4.2	22.0	54.52
	23:40	23	5.9	22.0	75.85
	13:49	23	5.8	22.0	74.56
	Averages	23.96	6.00	19.75	78.58
date	time	temp	do	flow	% Sat.
9-Sep	0:09	24	4.5	20.0	58.99
	0:23	24	2.4	20.0	31.46
	0:35	23	4.1	20.0	52.71
date	time	temp	do	flow	% Sat.
9-Sep	5:50	23	3.7	19.0	47.56
	6:01	22.5	5.0	19.0	63.65
	6:10	22.5	4.8	19.0	61.10
date	time	temp	do	flow	% Sat.
8-Sep	12:11	25.5	7.2	18.0	97.15
	12:22	25	7.4	18.0	98.89
	12:31	25	6.8	18.0	90.87
date	time	temp	do	flow	% Sat.
8-Sep	18:08	25	6.3	14.0	84.19
	18:18	25	6.3	14.0	84.19
	18:25	25	5.6	14.0	74.84
	Averages	24.13	5.34	17.75	70.19
date	time	temp	do	flow	% Sat.
14-Sep	5:30	20	3.2	27.0	38.76
	5:43	20	4.2	27.0	50.87
	5:50	20	4.9	26.0	59.35
date	time	temp	do	flow	% Sat.
13-Sep	12:40	24	5.8	22.0	76.03
	12:53	25	6.4	22.0	85.53
	13:01	25	5.6	22.0	74.84
date	time	temp	do	flow	% Sat.
13-Sep	18:47	22.5	4.2	23.0	53.46
	18:55	22.5	4.0	23.0	50.92
	19:03	22.5	7.3	23.0	92.93
date	time	temp	do	flow	% Sat.
13-Sep	23:43	21	5.2	18.0	64.26
	23:54	21	4.0	18.0	49.43
	0:02	21	3.4	18.0	42.02
	Averages	22.04	4.85	22.42	61.18

Note:flow data from USGS gage below Franklin

Site 8 Newsomes Mill, up stream side of breached dam

Latitude			Longitude		
36	4	50	86	59	47

date	time	temp	do	flow	% Sat.
4-Sep	6:00	22	4.0	24.0	50.42
	6:10	22	4.7	24.0	59.24
	6:20	22	4.2	24.0	52.94
date	**time**	**temp**	**do**	**flow**	**% Sat.**
4-Sep	12:30	23	6.0	22.0	77.13
	12:45	23	5.2	22.0	66.85
	12:55	23	5.0	22.0	64.28
date	**time**	**temp**	**do**	**flow**	**% Sat.**
4-Sep	17:45	23.5	5.1	20.0	66.20
	18:00	23.5	5.2	20.0	67.50
	18:15	23.5	5.1	20.0	66.20
date	**time**	**temp**	**do**	**flow**	**% Sat.**
4-Sep	0:00	22	5.6	19.0	70.59
	0:10	22	5.5	19.0	69.33
	0:20	22	5.6	19.0	70.59
	Averages	22.63	5.1	21.25	65.08
date	**time**	**temp**	**do**	**flow**	**% Sat.**
9-Sep	5:30	22	4.7	14.0	59.24
	5:40	22	4.8	14.0	60.50
	5:50	22	4.5	14.0	56.72
date	**time**	**temp**	**do**	**flow**	**% Sat.**
9-Sep	12:30	24	5.4	13.0	70.78
	12:45	24	5.0	13.0	65.54
	13:00	24	4.0	13.0	52.43
date	**time**	**temp**	**do**	**flow**	**% Sat.**
9-Sep	18:15	24.5	5.0	11.0	66.18
	18:25	24.5	4.4	11.0	58.24
	18:35	24.5	5.6	11.0	74.12
date	**time**	**temp**	**do**	**flow**	**% Sat.**
10-Sep	0:00	23	5.3	12.0	68.13
	0:15	23	5.5	12.0	70.70
	0:30	23	5.5	12.0	70.70
	Averages	23.38	5.0	12.50	64.42
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	5:30	21	5.5	15.0	67.97
	5:40	21	5.9	15.0	72.91
	5:50	21	5.1	15.0	63.02
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	13:00	22.5	5.8	14.0	73.83
	13:15	22.5	7.2	14.0	91.65
	13:30	22.5	6.9	14.0	87.83
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	18:10	23	6.3	13.0	80.99
	18:20	23	7.0	13.0	89.99
	18:30	23	6.8	13.0	87.41
date	**time**	**temp**	**do**	**flow**	**% Sat.**
17-Sep	23:30	22	6.1	14.0	76.89
	23:40	22	6.0	14.0	75.63
	23:50	22	6.0	14.0	75.63
	Averages	22.13	6.22	14.00	78.55

Note:flow data from USGS gage at Bellevue
does not include flow from Brown & Cartwright Crks

Site 9 1/4 mi north of Street Bridge to Jct w/ Harpeth, upsteam 100'

Latitude			Longitude		
36	6	12	87	7	31

date	time	temp	do	flow	% Sat.
28-Aug	4:10	23	3.0	102.0	38.57
	4:18	23	2.8	102.0	35.99
	4:27	23	2.8	102.0	35.99
date	**time**	**temp**	**do**	**flow**	**% Sat.**
27-Aug	11:03	22	7.2	102.0	90.76
	11:18	22	5.0	102.0	63.02
	11:28	22	6.4	102.0	80.67
date	**time**	**temp**	**do**	**flow**	**% Sat.**
27-Aug	17:16	24	7.6	102.0	99.62
	17:26	24	7.0	102.0	91.76
	17:32	24	6.2	102.0	81.27
date	**time**	**temp**	**do**	**flow**	**% Sat.**
27-Aug	23:06	23	3.6	102.0	46.28
	23:15	23	3.6	102.0	46.28
	23:23	23	3.8	102.0	48.85
	Averages	23.00	4.92	102.00	63.20
date	**time**	**temp**	**do**	**flow**	**% Sat.**
3-Sep	6:03	22	3.2	135.0	40.34
	6:12	22	4.2	135.0	52.94
	6:21	22	4.4	135.0	55.46
date	**time**	**temp**	**do**	**flow**	**% Sat.**
3-Sep	13:22	23	5.8	131.0	74.56
	13:29	23	7.2	131.0	92.56
	13:37	23	6.0	131.0	77.13
date	**time**	**temp**	**do**	**flow**	**% Sat.**
3-Sep	19:22	24	7.4	122.0	97.00
	19:33	24	7.0	122.0	91.76
	19:45	24	6.8	122.0	89.13
date	**time**	**temp**	**do**	**flow**	**% Sat.**
2-Sep	23:08	23	5.6	114.0	71.99
	23:18	23	4.8	114.0	61.70
	23:27	23	4.4	114.0	56.56
	Averages	23.00	5.57	125.50	71.56
date	**time**	**temp**	**do**	**flow**	**% Sat.**
date	**time**	**temp**	**do**	**flow**	**% Sat.**
date	**time**	**temp**	**do**	**flow**	**% Sat.**
date	**time**	**temp**	**do**	**flow**	**% Sat.**

Note: flow figures for site nine are from USGS gage at Kingston Springs and include flow from Turnbull Creek which is downstream of site nine

Site 10 Narrows of the Harpeth, at the take out gravel bar

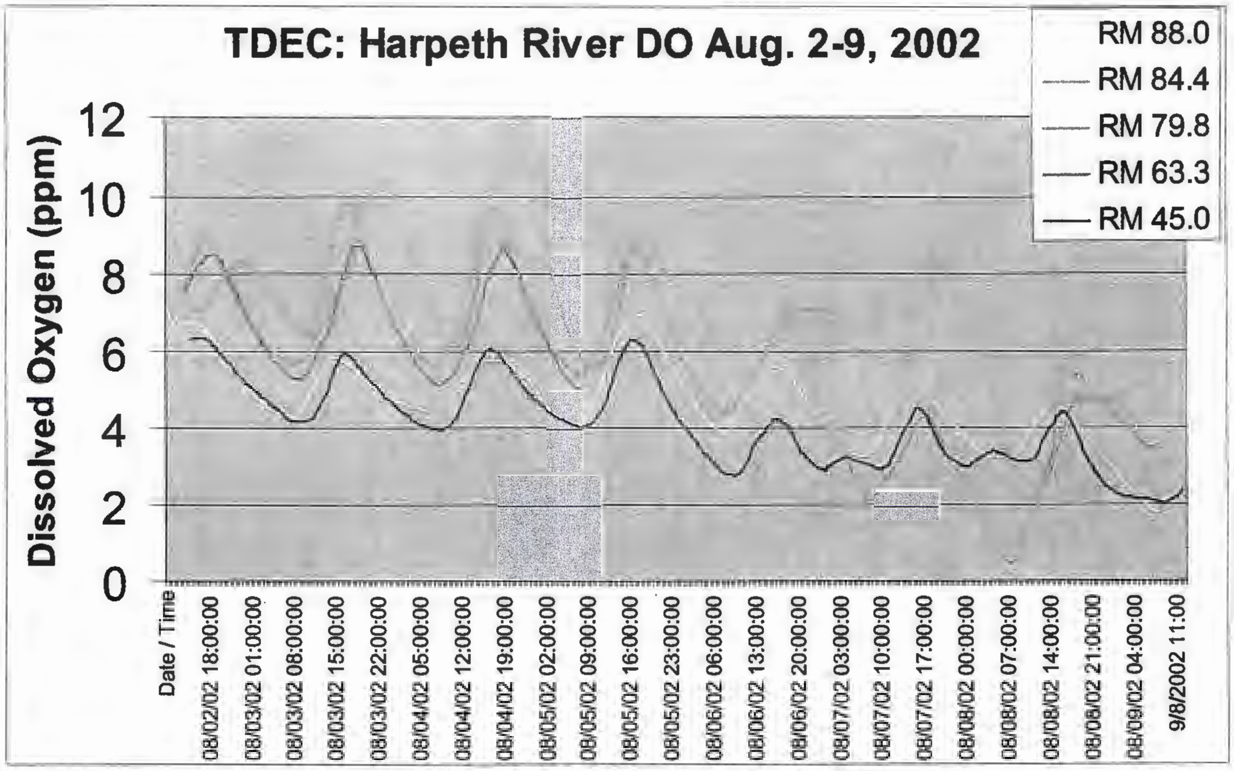
Latitude			Longitude		
36	9	9	87	7	9

date	time	temp	do	flow	% Sat.
28-Aug	4:59	22	4.4	102.0	55.46
	5:14	22	4.6	102.0	57.98
	5:30	22	4.4	102.0	55.46
date	**time**	**temp**	**do**	**flow**	**% Sat.**
27-Aug	12:01	22	5.6	102.0	70.59
	12:07	22	5.8	102.0	73.11
	12:13	22	6.2	102.0	78.15
date	**time**	**temp**	**do**	**flow**	**% Sat.**
27-Aug	18:05	24	6.8	102.0	89.13
	18:11	24	6.4	102.0	83.89
	18:16	24	5.6	102.0	73.41
date	**time**	**temp**	**do**	**flow**	**% Sat.**
27-Aug	23:58	22	5.0	102.0	63.02
28-Aug	0:05	22	5.8	102.0	73.11
28-Aug	0:11	22	5.0	102.0	63.02
	Averages	22.50	5.47	102.00	69.59
date	**time**	**temp**	**do**	**flow**	**% Sat.**
3-Sep	5:07	23	2.8	135.0	35.99
	5:17	23	5.2	135.0	66.85
	5:24	23	4.2	135.0	53.99
date	**time**	**temp**	**do**	**flow**	**% Sat.**
3-Sep	12:06	23	5.4	131.0	69.42
	12:12	23	5.8	131.0	74.56
	12:19	23	5.4	131.0	69.42
date	**time**	**temp**	**do**	**flow**	**% Sat.**
3-Sep	18:40	24	7.0	122.0	91.76
	18:45	24	7.0	122.0	91.76
	18:52	24	7.4	122.0	97.00
date	**time**	**temp**	**do**	**flow**	**% Sat.**
2-Sep	23:59	24	4.2	114.0	55.05
3-Sep	0:08	24	3.8	114.0	49.81
3-Sep	0:15	24	4	114.0	52.43
	Averages	23.50	5.18	125.50	67.29
date	**time**	**temp**	**do**	**flow**	**% Sat.**
date	**time**	**temp**	**do**	**flow**	**% Sat.**
date	**time**	**temp**	**do**	**flow**	**% Sat.**
date	**time**	**temp**	**do**	**flow**	**% Sat.**

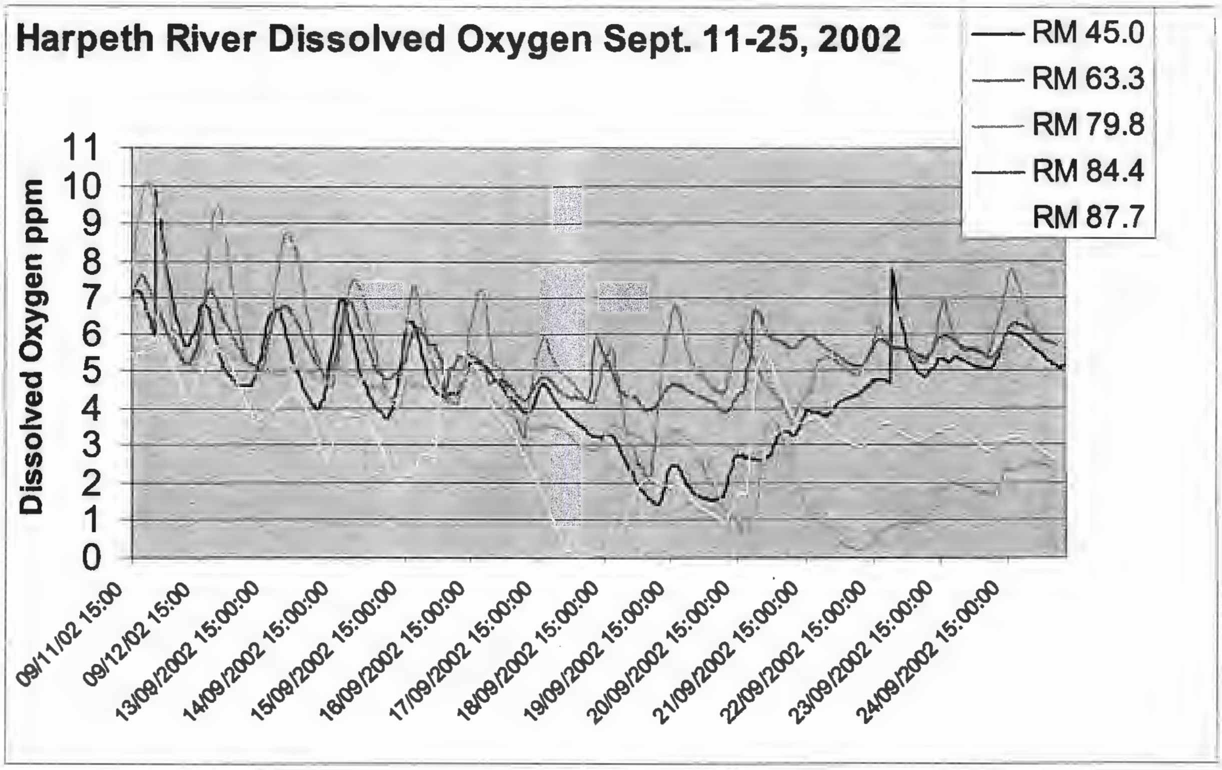
Note:flow data from USGS gage at Franklin

*data is an outlier, 3.9 std deviations from mean

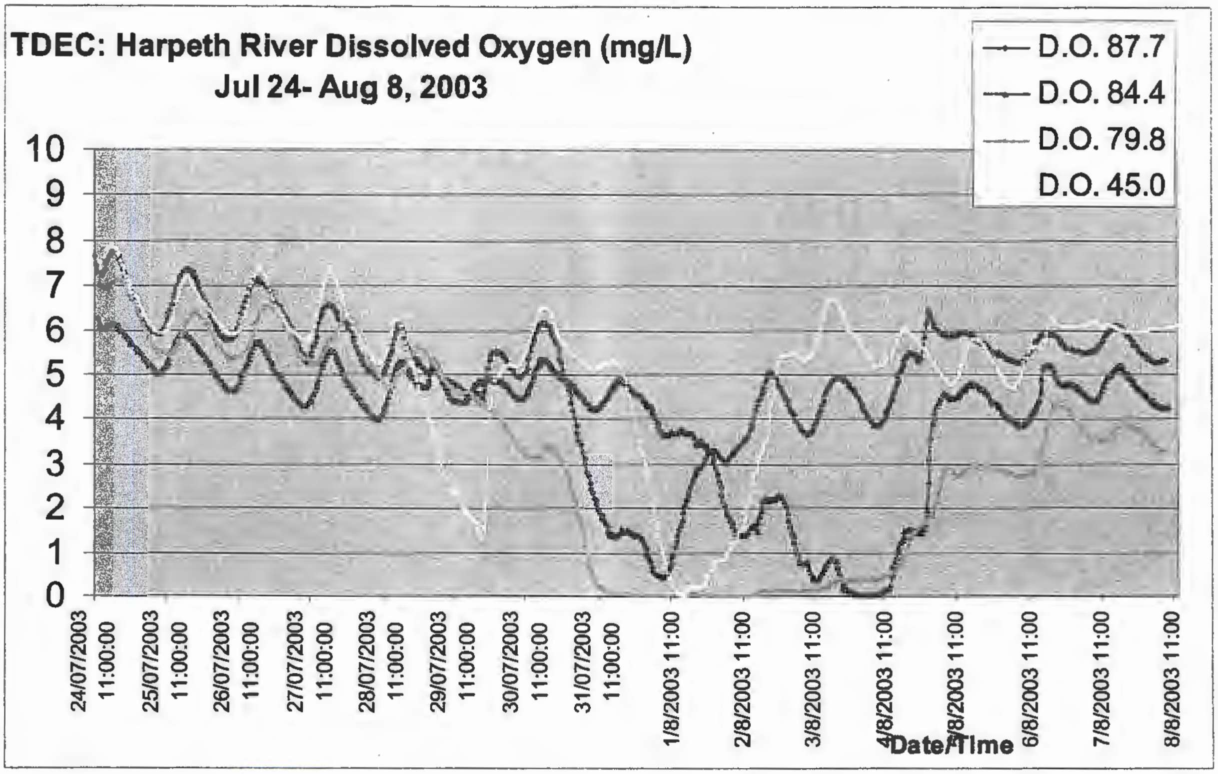
Appendix E -
TDEC 2002 and 2003 Dissolved Oxygen Diurnal Graphs



RM 88— Highway 96 bridge over Harpeth, where USGS gage at Franklin is located.
RM 84.4—Hillsboro Road bridge over Harpeth, where USGS gage downstream from Franklin is located.
RM 79.8—Cotton Lane Bridge over Harpeth River.
RM 63.3—Highway 100 bridge over Harpeth River.
RM 45 — Kingston Springs before South Harpeth, at I-40 West bridge



RM 87.7—Franklin Road bridge over Harpeth River (between two USGS gages in Franklin)
RM 84.4—Hillsboro Road bridge over Harpeth, where USGS gage Below Franklin is located.
RM 79.8—Cotton Lane Bridge over Harpeth River.
RM 63.3—Highway 100 bridge over Harpeth River.
RM 45—Kingston Springs before South Harpeth, at I-40 West bridge



RM 87.7—Franklin Road bridge over Harpeth River (between two USGS gages in Franklin)
RM 84.4—Hillsboro Road bridge over Harpeth, where USGS gage Below Franklin is located.
RM 79.8—Cotton Lane Bridge over Harpeth River.
RM 45—Kingston Springs before South Harpeth, at I-40 West bridge.

Appendix F—
HRWA Dissolved Oxygen Study Report 2002

HARPETH RIVER
WATERSHED
ASSOCIATION

HARPETH RIVER MAIN STEM DISSOLVED OXYGEN STUDY

September 18, 2002
Report prepared by David J. Wilson

Introduction

Dissolved oxygen (dissolved O_2, a.k.a. DO) is essential for fish and benthic macroinvertebrates. Although the concentration of oxygen in the air is quite high, O_2 is not very soluble in water, as indicated in Table 1 (following page); at saturation under one atm of air the oxygen concentration in water at room temperature is about 8.2 mg/L (8.2 parts per million, ppm). This is sufficient to maintain aquatic life. The regulatory minimum permissible DO is 5.0 mg/L.

There are a number of factors that affect the DO concentration:

1. Efficiency of re-aeration from the atmosphere. Efficiency of oxygen transport is high in shallow, turbulent streams; it is poor in deep, slow-moving or stagnant streams.

2. Temperature. The solubility of oxygen in water decreases with increasing temperature. For example, at 14°C the solubility of oxygen in pure water (no dissolved salts) is 10.30 mg/L, while at 30°C it is only 7.56 mg/L.

3. Presence of Biochemical (Biological) Oxygen Demand, BOD. BOD consists of organic material (food processing wastes, human and animal feces and urine, paper mill wastes, dead and decomposing algae and leaves, etc.) that can be used as food by stream bacteria naturally present in surface waters. As the bacteria feed upon the BOD, they consume oxygen. They also multiply. If there is sufficient BOD present, its metabolism by the stream bacteria will use up all of the dissolved oxygen in the water. At this point fish and most benthic macroinvertebrates die of suffocation—we have a fish kill.

4. Presence of plant nutrients and sunlight. If the water contains sufficient plant nutrients (principally nitrate and phosphate) and is exposed to a substantial amount of sunlight, the algae in the water will grow very rapidly, perhaps to the point where a "bloom" results, making the water very turbid and greenish in color. During the day the algae use the sunlight, carbon dioxide, and water to photosynthesize, in the course of which they increase their biomass and also generate oxygen. This results in increasing DO concentrations during the daylight hours. At night, however, photosynthesis is not possible, the algae are metabolizing (a process that uses up oxygen), and DO concentrations go down. Streams that receive nitrates and phosphates from fertilizer runoff or other sources, and that are relatively unshaded from the sun are particularly prone to large day-to-night swings in DO concentration, with the minimum DO occurring just about at dawn and the maximum at about sunset. The effect is particularly large when the water is warm, so that biological processes are rapid, and days are long, so there is lots of light.

Table 1. Oxygen solubility in water at 1 atm (760 mm Hg) pressure of air

Temperature, °C	Chlorinity, g/L 0.0	0.5	1.0
	Oxygen solubility, mg/L		
10	11.28	11.22	11.15
12	10.77	10.71	10.65
14	10.30	10.24	10.19
16	9.87	9.81	9.76
18	9.47	9.42	9.36
20	9.09	9.05	9.00
22	8.75	8.70	8.65
24	8.42	8.38	8.33
26	8.12	8.08	8.03
28	7.83	7.79	7.75
30	7.56	7.52	7.49
32	7.30	7.27	7.23
34	7.06	7.03	6.99
36	6.83	6.80	6.77
38	6.62	6.59	6.56
40	6.41	6.38	6.35

At barometric pressure P (mm Hg), the solubility S' is given from the corresponding value in the table, S, by

$$S' = S\cdot(P - p)/(760 - p)$$

where p is the pressure (mm Hg) of saturated water vapor pressure at the given temperature.

The Harpeth River exhibits characteristics that lead one to expect that it suffers from low DO concentrations during the latter part of the summer and early fall. It receives plant nutrients from wastewater treatment plant effluents, runoff from lawns and golf courses, and runoff from agriculture and animal husbandry. Much of the river is relatively unshaded due to destruction of riparian vegetation. And there are frequent relatively deep, quiescent sections in which re-aeration is inefficient, particularly during periods of low flow during the summer and early fall. Data obtained by EPA during the period August 22-25 had indicated that there was a problem, with minimum DO concentrations ranging from 3 to 4.5 and maximum DO concentrations of 7-12 in the reaches of the river in which we were interested. Interestingly, the EPA study found a minimum DO concentration of 0.21 mg/L at their most upstream site at river mile 114.6, far upstream from Franklin.

The Harpeth River Watershed Association therefore decided to carry out a dissolved oxygen study on the Harpeth between Riverwalk Park in Franklin and the Highway 100 bridge in Bellevue. Members of the HRWA's Science and Policy Committee designed the study. The project design was based upon the lessons learned from a similar study in August 2001 using trained volunteers with Hydrolabs or a Winkler method digital titrator kit at four sites.

Methods and sampling stations

A number of techniques for measuring DO were tried (various meters, Winkler drop count titration, Winkler syringe, and Winkler digital titrator); the Winkler digital titrator kit from the Hach Chemical Co. was selected on the basis of consistent precision of the results. Three of these kits were used in the study.

Sampling stations are located at the following sites (upstream to downstream):

1. Harpeth River at Riverwalk Park, 4th Ave N and Hillsboro Rd, upstream from the Franklin, TN sewage treatment plant (STP). Approx. river mi. 87
   35°55'45"N, 86°52'30"W

2. Harpeth River at Williamson County Park canoe dock, downstream from the Franklin STP. Approx. river mi. 85.5
   35°56'40"N, 86°52'15"W

3. Harpeth River at Highway 46 bridge, Old Hillsboro Rd. Approx. river mi. 76.5
   35°59'35"N, 86°53'58"W

4. Harpeth River at Moran Road bridge. Approx. river mi. 68
   36°01'01"N, 86°53'58"W

5. Harpeth River at Highway 100 bridge, Bellevue. Approx. river mi. 62.4
   36°03'15"N, 86°55'43"W

These are marked on the attached map of the Harpeth River watershed. (The map is not included in the electronic version of this report).

Early morning minimum DO values at the various stations, August 24, 2002

The following DO concentrations were observed at the five stations the morning of August 24, 2002:

Site	Time	DO, mg/L	T, °C	% sat'n.
1. Harpeth River at Riverwalk Park	4-5 AM	3.76		
		4.14		
2. Harpeth R at Williamson Co. Park dock	4-5 AM	5.42		
		5.48		
		5.28		
3. Harpeth R at Highway 46 bridge	4:50 AM	4.30	26.1	53
	5:15	4.28	"	53
	5:35	4.28	"	53
4. Harpeth R at Moran Rd bridge	5:40 AM	3.86		
	6:05	3.95		
	6:20	4.00		
5. Harpeth R at Highway 100 bridge	6:30 AM	4.12	26.1	51
	6:50	4.37	"	54
	7:13	4.24	"	52

Effect of algal diurnal cycle

Sets of runs were made at Site 6 (Harpeth River at Highway 100) at dawn and late in the afternoon on August 26, 2001, and again on August 24, 2002. The results are as follows:

Date	Time	DO, mg/L	T, °C	% sat'n.
August 26, 2001	4:15 AM	5.26		
morning	4:45	5.22		
	5:15	5.04		
	5:45	5.00		
	6:15	5.20 (bubble in DO bottle)		
	6:30	5.16		
	6:45	5.10		
	7:15	5.10		
	7:45	5.08		
	8:15	5.12		
	8:45	5.24		
	9:15 AM	5.10		
afternoon	5:15 PM	6.34		

	5:45	6.40		
	6:15	6.40		
August 24, 2002 morning	6:30 AM	4.12	26.1	51
	6:50	4.37	"	54
	7:13 AM	4.24	"	52
afternoon	4:00 PM	6.95	28.9	90
	4:30 PM	6.78	"	88

In the 2001 sampling the diurnal variation in DO concentration was approximately 1.2 mg/L; in the 2002 sampling it was approximately 2.6 mg/L.

Sets of runs were made the afternoon of August 23, 2002 and in the early morning of August 24 at Sites 1 (Riverwalk Park) and 2 (Williamson County Park). The results are as follows:

Site	Time	DO (mg/L)
Site 1	1:20 – 2:00 PM, 8/23/02	6.8, 6.8
	4:00 – 5:00 AM, 8/24/02	3.76, 4.14
Site 2	2:15 – 3:00 PM, 8/23/02	6.7, 6.9
	4:00 – 5:00 AM, 8/24/02	5.42, 5.48, 5.28

Conclusions

Four of the five sites, including Site 1 (upstream from the Franklin STP) were in violation of the regulatory minimum DO standard of 5.0 mg/L the morning of August 24, 2002. The only site that is in compliance is Site 2, just downstream from the Franklin STP. Because of the rather limited data set at present, one can only tentatively draw the following conclusions:

1. The dissolved oxygen concentrations in the discharge from the Franklin STP appear to be sufficient that the DO levels of this discharge are not exacerbating the DO problem in this section of the Harpeth River.

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3. The moderately large diurnal swing (2.6 mg/L) in DO concentrations observed at Site 5 suggests that algae are a major contributor to the problem. This, in turn, suggests that the problems may be (1) nutrients—nitrates and phosphates, and (2) unshaded streams. The high temperature of the water and the low stream flow are certainly contributing factors.

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The Harpeth River Watershed Association is very grateful to all the members of the Science and Policy Committee who represent a range of scientific and policy expertise that they donate on behalf of the mission to work together to protect and restore the ecological health of the Harpeth River and its watershed.

HARPETH RIVER WATERSHED ASSOCIATION

HARPETH RIVER MAIN STEM DISSOLVED OXYGEN STUDY

September 18, 2002
Report prepared by David J. Wilson

Introduction

Dissolved oxygen (dissolved O_2, a.k.a. DO) is essential for fish and benthic macroinvertebrates. Although the concentration of oxygen in the air is quite high, O_2 is not very soluble in water, as indicated in Table 1 (following page); at saturation under one atm of air the oxygen concentration in water at room temperature is about 8.2 mg/L (8.2 parts per million, ppm). This is sufficient to maintain aquatic life. The regulatory minimum permissible DO is 5.0 mg/L.

There are a number of factors that affect the DO concentration:

1. Efficiency of re-aeration from the atmosphere. Efficiency of oxygen transport is high in shallow, turbulent streams; it is poor in deep, slow-moving or stagnant streams.

2. Temperature. The solubility of oxygen in water decreases with increasing temperature. For example, at 14°C the solubility of oxygen in pure water (no dissolved salts) is 10.30 mg/L, while at 30°C it is only 7.56 mg/L.

3. Presence of Biochemical (Biological) Oxygen Demand, BOD. BOD consists of organic material (food processing wastes, human and animal feces and urine, paper mill wastes, dead and decomposing algae and leaves, etc.) that can be used as food by stream bacteria naturally present in surface waters. As the bacteria feed upon the BOD, they consume oxygen. They also multiply. If there is sufficient BOD present, its metabolism by the stream bacteria will use up all of the dissolved oxygen in the water. At this point fish and most benthic macroinvertebrates die of suffocation—we have a fish kill.

4. Presence of plant nutrients and sunlight. If the water contains sufficient plant nutrients (principally nitrate and phosphate) and is exposed to a substantial amount of sunlight, the algae in the water will grow very rapidly, perhaps to the point where a "bloom" results, making the water very turbid and greenish in color. During the day the algae use the sunlight, carbon dioxide, and water to photosynthesize, in the course of which they increase their biomass and also generate oxygen. This results in increasing DO concentrations during the daylight hours. At night, however, photosynthesis is not possible, the algae are metabolizing (a process that uses up oxygen), and DO concentrations go down. Streams that receive nitrates and phosphates from fertilizer runoff or other sources, and that are relatively unshaded from the sun are particularly prone to large day-to-night swings in DO concentration, with the minimum DO occurring just about at dawn and the maximum at about sunset. The effect is particularly large when the water is warm, so that biological processes are rapid, and days are long, so there is lots of light.

Table 1. Oxygen solubility in water at 1 atm (760 mm Hg) pressure of air

Temperature, °C	Chlorinity, g/L 0.0	0.5	1.0
	Oxygen solubility, mg/L		
10	11.28	11.22	11.15
12	10.77	10.71	10.65
14	10.30	10.24	10.19
16	9.87	9.81	9.76
18	9.47	9.42	9.36
20	9.09	9.05	9.00
22	8.75	8.70	8.65
24	8.42	8.38	8.33
26	8.12	8.08	8.03
28	7.83	7.79	7.75
30	7.56	7.52	7.49
32	7.30	7.27	7.23
34	7.06	7.03	6.99
36	6.83	6.80	6.77
38	6.62	6.59	6.56
40	6.41	6.38	6.35

At barometric pressure P (mm Hg), the solubility S' is given from the corresponding value in the table, S, by

$$S' = S \cdot (P - p)/(760 - p)$$

where p is the pressure (mm Hg) of saturated water vapor pressure at the given temperature.

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The Harpeth River exhibits characteristics that lead one to expect that it suffers from low DO concentrations during the latter part of the summer and early fall. It receives plant nutrients from wastewater treatment plant effluents, runoff from lawns and golf courses, and runoff from agriculture and animal husbandry. Much of the river is relatively unshaded due to destruction of riparian vegetation. And there are frequent relatively deep, quiescent sections in which re-aeration is inefficient, particularly during periods of low flow during the summer and early fall. Data obtained by EPA during the period August 22-25 had indicated that there was a problem, with minimum DO concentrations ranging from 3 to 4.5 and maximum DO concentrations of 7-12 in the reaches of the river in which we were interested. Interestingly, the EPA study found a minimum DO concentration of 0.21 mg/L at their most upstream site at river mile 114.6, far upstream from Franklin.

The Harpeth River Watershed Association therefore decided to carry out a dissolved oxygen study on the Harpeth between Riverwalk Park in Franklin and the Highway 100 bridge in Bellevue. Members of the HRWA's Science and Policy Committee designed the study. The project design was based upon the lessons learned from a similar study in August 2001 using trained volunteers with Hydrolabs or a Winkler method digital titrator kit at four sites.

Methods and sampling stations

A number of techniques for measuring DO were tried (various meters, Winkler drop count titration, Winkler syringe, and Winkler digital titrator); the Winkler digital titrator kit from the Hach Chemical Co. was selected on the basis of consistent precision of the results. Three of these kits were used in the study.

Sampling stations are located at the following sites (upstream to downstream):

1. Harpeth River at Riverwalk Park, 4th Ave N and Hillsboro Rd, upstream from the Franklin, TN sewage treatment plant (STP). Approx. river mi. 87
   35°55'45"N, 86°52'30"W

2. Harpeth River at Williamson County Park canoe dock, downstream from the Franklin STP. Approx. river mi. 85.5
   35°56'40"N, 86°52'15"W

3. Harpeth River at Highway 46 bridge, Old Hillsboro Rd. Approx. river mi. 76.5
   35°59'35"N, 86°53'58"W

4. Harpeth River at Moran Road bridge. Approx. river mi. 68
   36°01'01"N, 86°53'58"W

5. Harpeth River at Highway 100 bridge, Bellevue. Approx. river mi. 62.4
   36°03'15"N, 86°55'43"W

These are marked on the attached map of the Harpeth River watershed. (The map is not included in the electronic version of this report).

Early morning minimum DO values at the various stations, August 24, 2002

The following DO concentrations were observed at the five stations the morning of August 24, 2002:

Site	Time	DO, mg/L	T, °C	% sat'n.
1. Harpeth River at Riverwalk Park	4-5 AM	3.76		
		4.14		
2. Harpeth R at Williamson Co. Park dock	4-5 AM	5.42		
		5.48		
		5.28		
3. Harpeth R at Highway 46 bridge	4:50 AM	4.30	26.1	53
	5:15	4.28	"	53
	5:35	4.28	"	53
4. Harpeth R at Moran Rd bridge	5:40 AM	3.86		
	6:05	3.95		
	6:20	4.00		
5. Harpeth R at Highway 100 bridge	6:30 AM	4.12	26.1	51
	6:50	4.37	"	54
	7:13	4.24	"	52

Effect of algal diurnal cycle

Sets of runs were made at Site 6 (Harpeth River at Highway 100) at dawn and late in the afternoon on August 26, 2001, and again on August 24, 2002. The results are as follows:

Date	Time	DO, mg/L	T, °C	% sat'n.
August 26, 2001	4:15 AM	5.26		
morning	4:45	5.22		
	5:15	5.04		
	5:45	5.00		
	6:15	5.20 (bubble in DO bottle)		
	6:30	5.16		
	6:45	5.10		
	7:15	5.10		
	7:45	5.08		
	8:15	5.12		
	8:45	5.24		
	9:15 AM	5.10		
afternoon	5:15 PM	6.34		

	5:45	6.40		
	6:15	6.40		
August 24, 2002	6:30 AM	4.12	26.1	51
morning	6:50	4.37	"	54
	7:13 AM	4.24	"	52
afternoon	4:00 PM	6.95	28.9	90
	4:30 PM	6.78	"	88

In the 2001 sampling the diurnal variation in DO concentration was approximately 1.2 mg/L; in the 2002 sampling it was approximately 2.6 mg/L.

Sets of runs were made the afternoon of August 23, 2002 and in the early morning of August 24 at Sites 1 (Riverwalk Park) and 2 (Williamson County Park). The results are as follows:

Site	Time	DO (mg/L)
Site 1	1:20 – 2:00 PM, 8/23/02	6.8, 6.8
	4:00 – 5:00 AM, 8/24/02	3.76, 4.14
Site 2	2:15 – 3:00 PM, 8/23/02	6.7, 6.9
	4:00 – 5:00 AM, 8/24/02	5.42, 5.48, 5.28

Conclusions

Four of the five sites, including Site 1 (upstream from the Franklin STP) were in violation of the regulatory minimum DO standard of 5.0 mg/L the morning of August 24, 2002. The only site that is in compliance is Site 2, just downstream from the Franklin STP. Because of the rather limited data set at present, one can only tentatively draw the following conclusions:

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AquAeTer

HARPETH RIVER WATERSHED ASSOCIATION

Presentation to

AWRA

MONTGOMERY BELL STATE PARK

DISSOLVED OXYGEN IN THE HARPETH RIVER:

CONNECTING POINT SOURCE, NON-POINT SOURCE, AND WATER WITHDRAWALS

Prepared by HRWA/AquAeTer, Inc.

Dorie Bolze Pam Davee

John Michael Corn, P.E. Michael R. Corn, P.E.

HARPETH RIVER WATERSHED

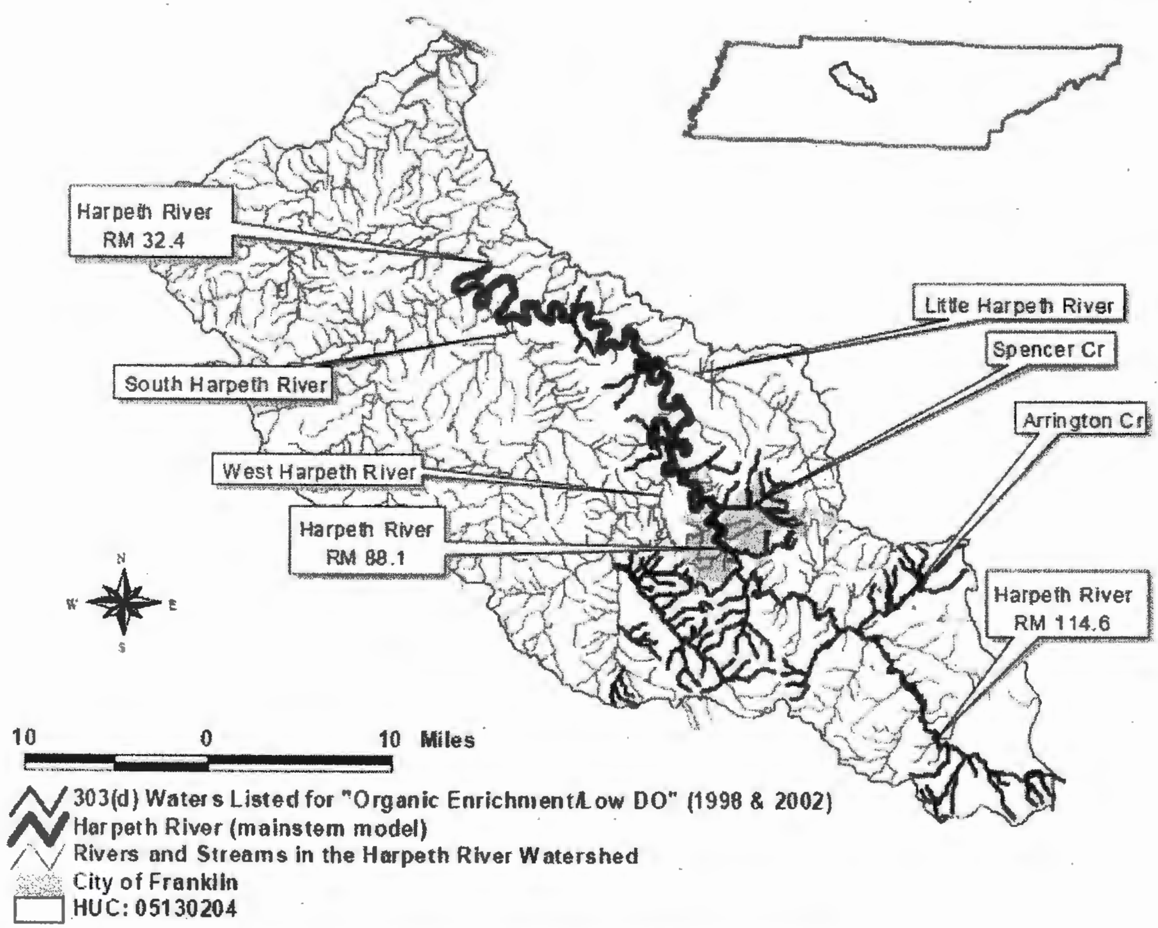
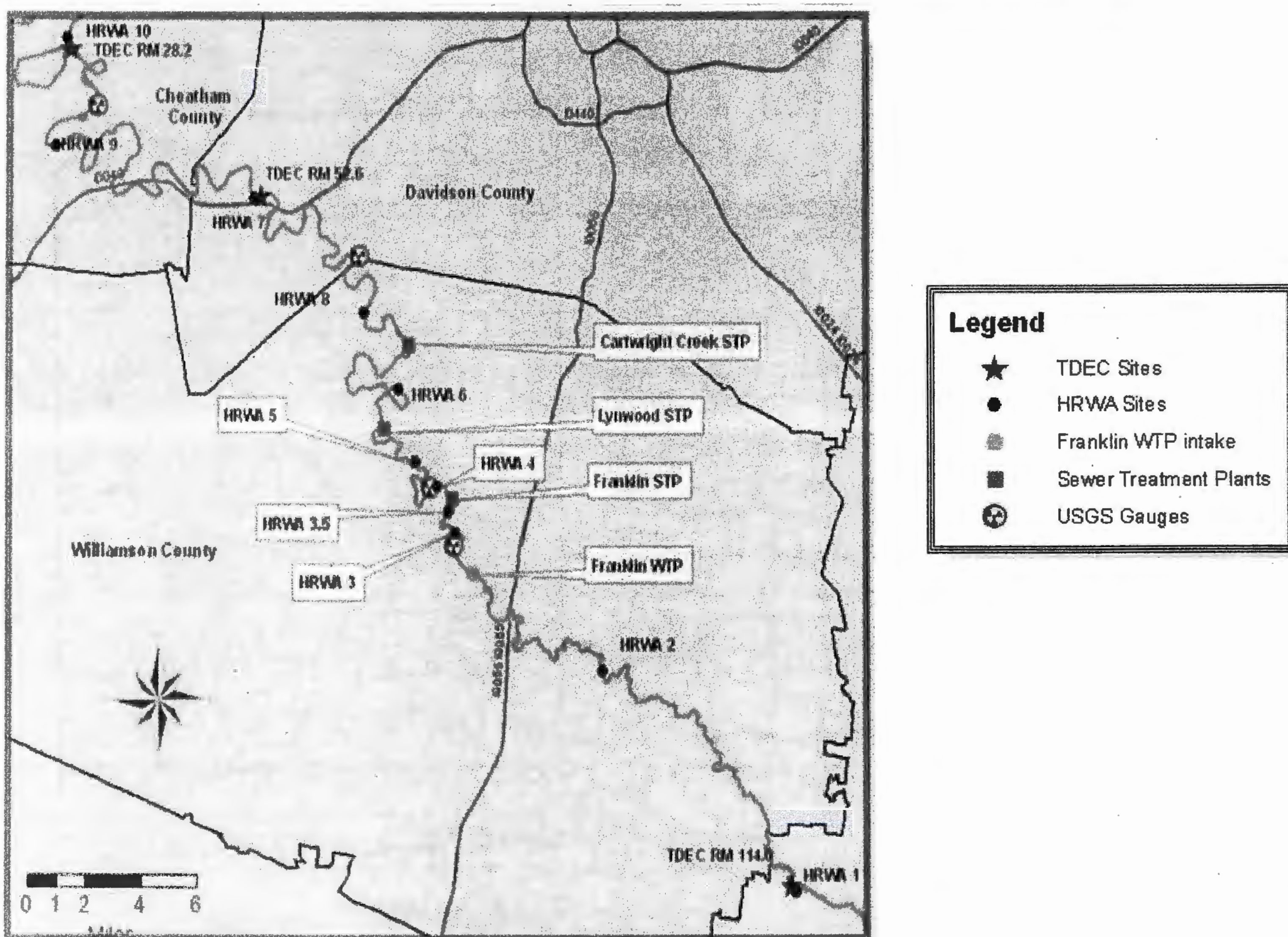
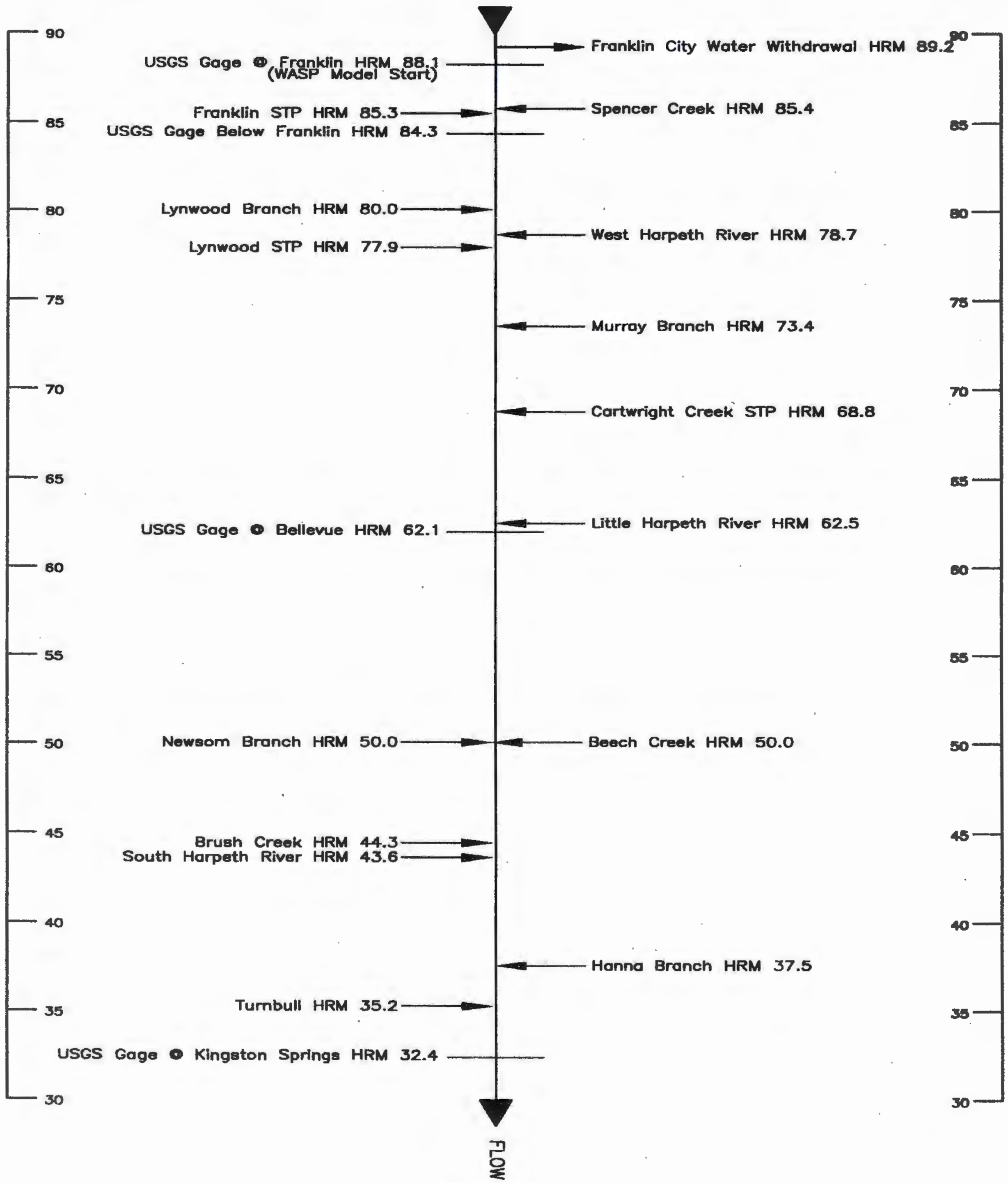


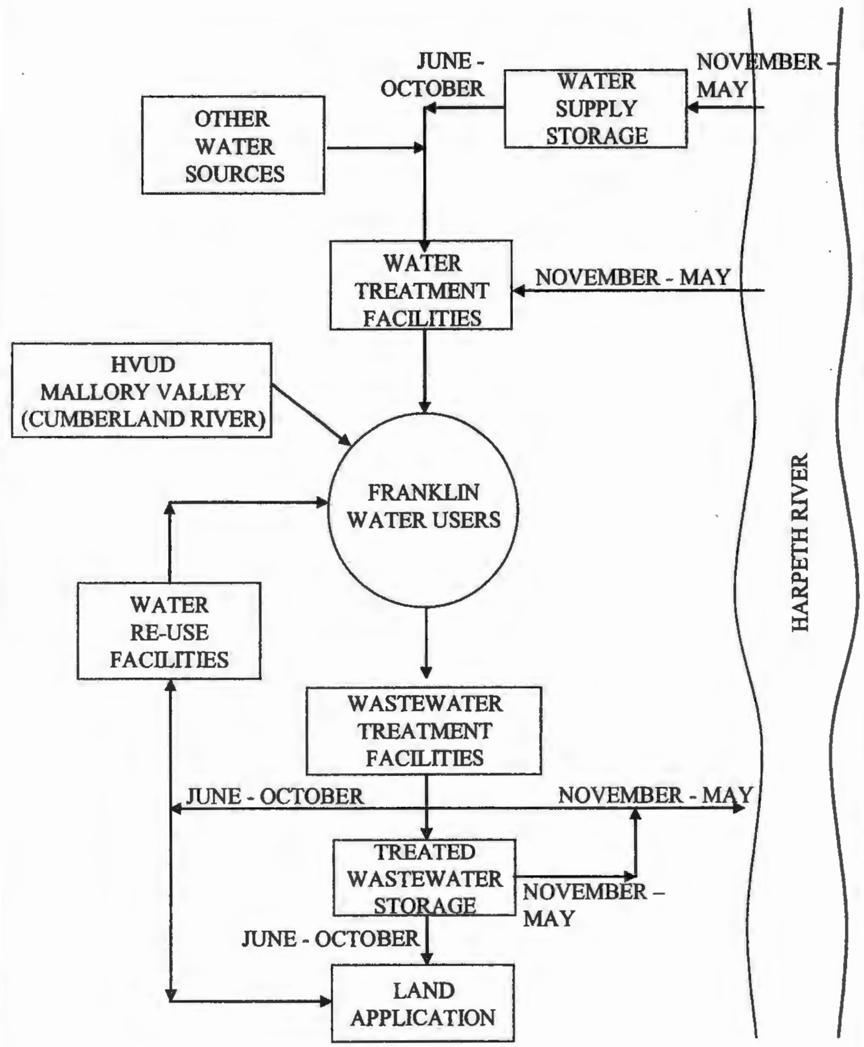
Figure 1 Harpeth River Watershed

HRWA & TDEC DISSOLVED OXYGEN STUDY - AUGUST AND SEPTEMBER 2006





90
85
80
75
70
65
60
55
50
45
40
35
30
Franklin City Water Withdrawal HRM 89.2
USGS Gage @ Franklin HRM 88.1
(WASP Model Start)
Franklin STP HRM 85.3
Spencer Creek HRM 85.4
USGS Gage Below Franklin HRM 84.3
Lynwood Branch HRM 80.0
West Harpeth River HRM 78.7
Lynwood STP HRM 77.9
Murray Branch HRM 73.4
Cartwright Creek STP HRM 68.8
Little Harpeth River HRM 62.5
USGS Gage @ Bellevue HRM 62.1
Newsom Branch HRM 50.0
Beech Creek HRM 50.0
Brush Creek HRM 44.3
South Harpeth River HRM 43.6
Hanna Branch HRM 37.5
Turnbull HRM 35.2
USGS Gage @ Kingston Springs HRM 32.4
FLOW



AquAeTer

CLIENT: HRWA
LOCATION: Harpeth River
PROJECT/FILE: 061512

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FIGURE 1

SCHEMATIC OF WASTEWATER ALTERNATIVES

DEFINITIONS

- **ASSIMILATIVE CAPACITY – How much organic carbon and nitrogen mass loadings that the stream can accept without degrading the dissolved oxygen in the stream below 5 mg/L and not causing nuisance algal blooms in the Harpeth River**
- **DISSOLVED OXYGEN – USEPA established in 1972 a nation-wide standard of 5 mg/L for dissolved oxygen that has to be met in all U.S. streams and lakes**
- **ANTI-DEGRADATION – A stream that is not meeting water-quality standards cannot be further degraded**
- **EFFLUENT TECHNOLOGY LIMITS – Treatment standards that must be met by all municipal dischargers**
- **WATER-QUALITY BASED TREATMENT LIMITS – More stringent treatment standards that must be met if the technology limits do not result in stream water quality standards being met**
- **1 million gallons per day (mgd) = 1.547 cubic feet per second (cfs)**

REGULATORY REQUIREMENTS

1. **Franklin's water treatment plant can cause degradation of the water quality only if there are no other economically feasible alternatives for water supply.**
2. **Franklin POTW must meet its permit discharge limits for organics (BOD) and nutrients (nitrogen)**
3. **The Franklin POTW, Lynwood Utility and Cartwright Creek Utility must also meet the stream water quality standard for dissolved oxygen of 5 mg/L**
4. **Neither Franklin, Lynwood nor Cartwright Creek can further degrade the Harpeth River if it is not meeting the dissolved oxygen standard of 5 mg/L upstream from the effluent discharge point**

WATER WITHDRAWAL REGULATORY REQUIREMENTS

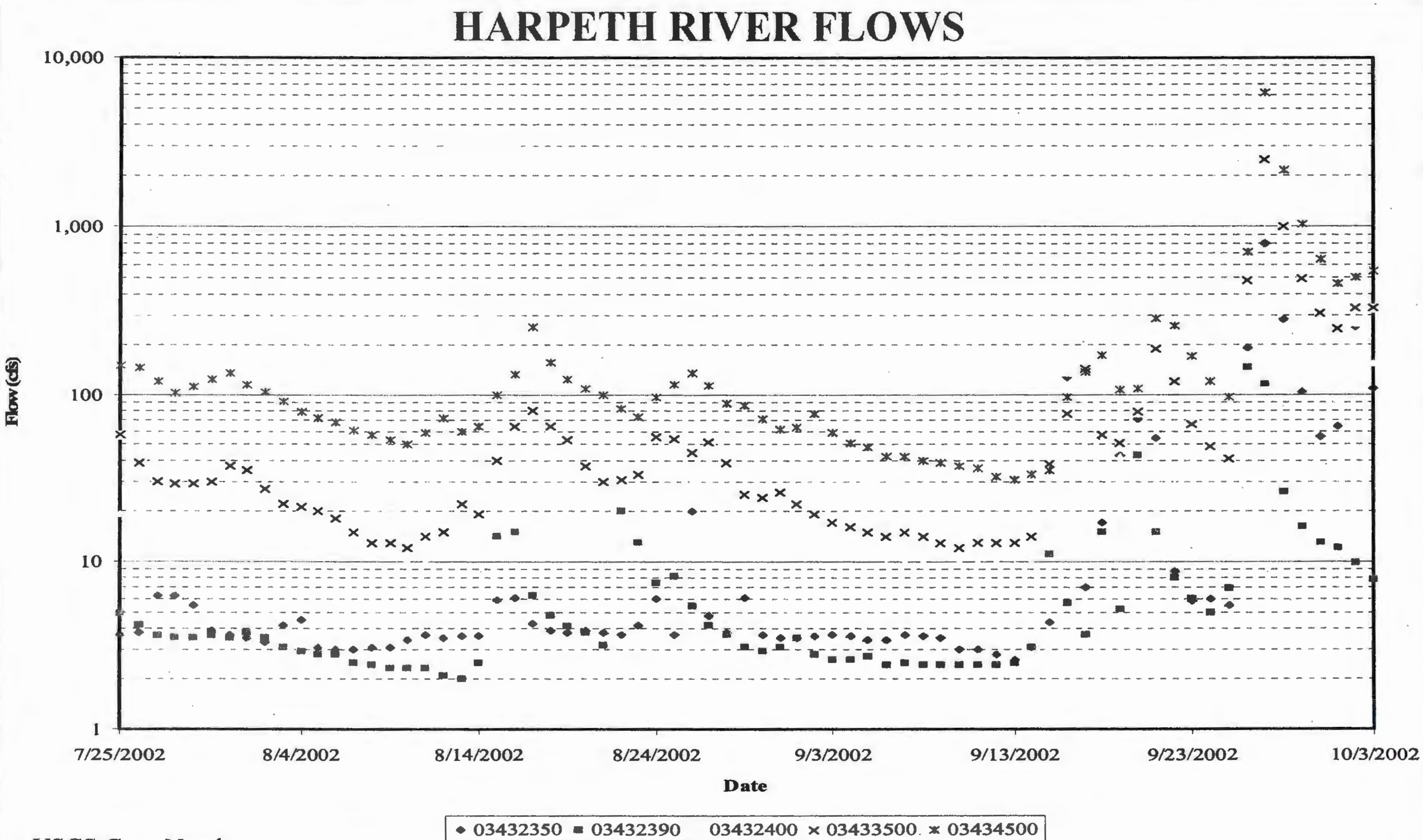
- **TDEC water pollution regulations exemption 4: "existing water withdrawals on July 25, 2000 <u>which do not adversely alter or effect the classified use of the source stream</u> are not subject to these requirements." (1200-4-7-.02) (Grandfather Clause)**
- **TDEC regulations and statute: "it is unlawful ... To carry out any activity which may result in the alteration of the physical, chemical, radiological, biological, or bacteriological properties of any waters of the state, including wetlands. These activities include, but are not limited to: ... water withdrawals, ..." (1200-4-7-.01)**

IMPORTANT CONSTRAINTS ON RIVER ASSIMILATIVE CAPACITY

- FLOW UPSTREAM FROM THE FRANKLIN POTW
- WATER TEMPERATURE
- DISSOLVED OXYGEN IN THE RIVER WATER COMING TO EACH OF THESE FACILITIES

AquAeTer
BRENTWOOD, TENNESSEE

AVAILABLE VS NEEDED WATER
IN THE HARPETH RIVER



USGS Gage Numbers:

03432350 – Harpeth River at Franklin
03432390 – Spencer Creek at Franklin
03432400 – Harpeth River below Franklin
03433500 – Harpeth River at Bellevue
03434500 – Harpeth River at Kingston Springs

CLIENT: Harpeth River Watershed Association	FIGURE – FLOWS
LOCATION: Franklin, Tennessee	
PROJECT/FILE: 061512	

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USEPA DISSOLVED OXYGEN DATA AUGUST 2000

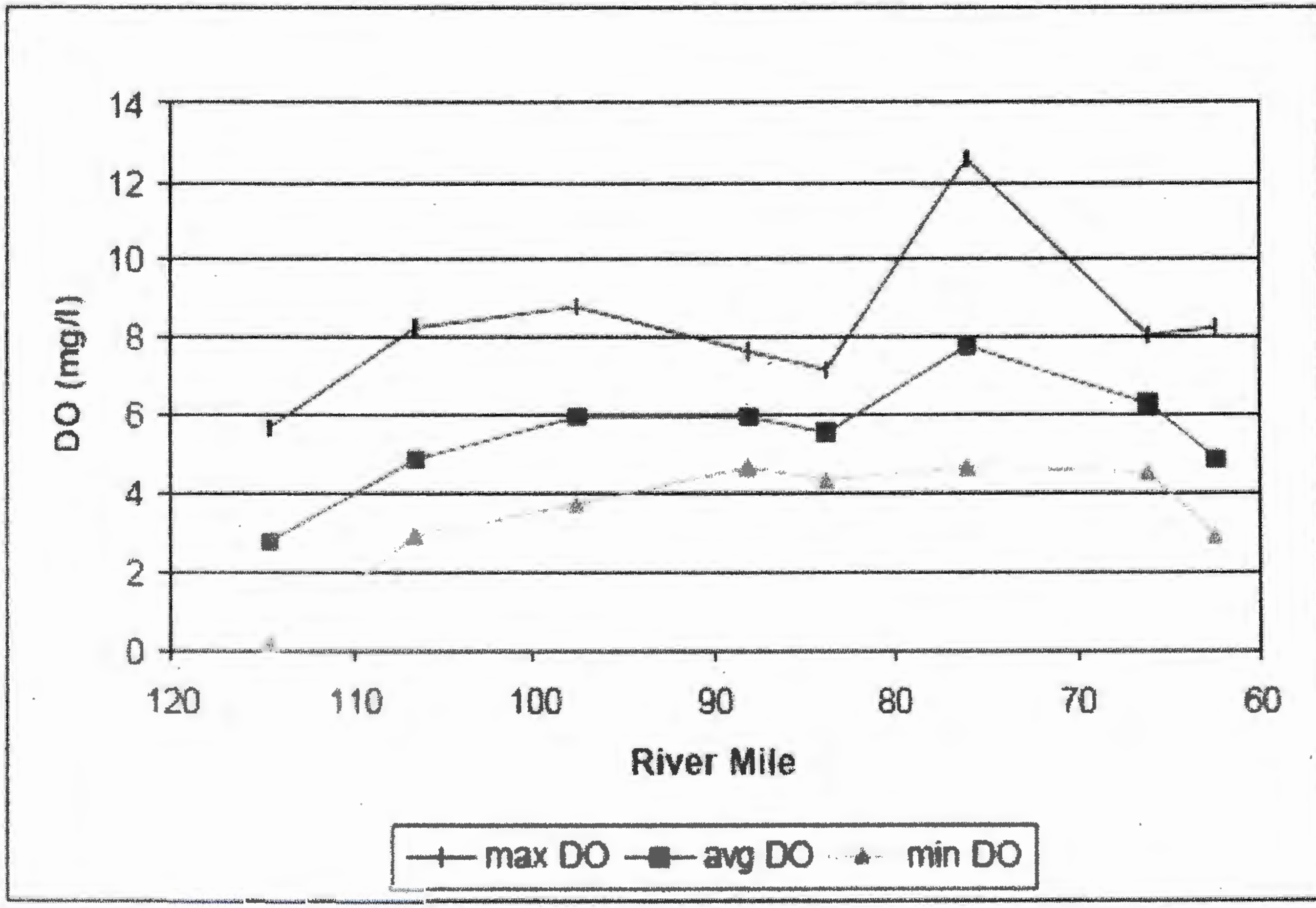


Figure 5 Longitudinal DO profile during the August 2000 study

LOW FLOWS ON THE HARPETH RIVER

TABLE. SUMMARY OF 7Q10 FLOWS AT FRANKLIN

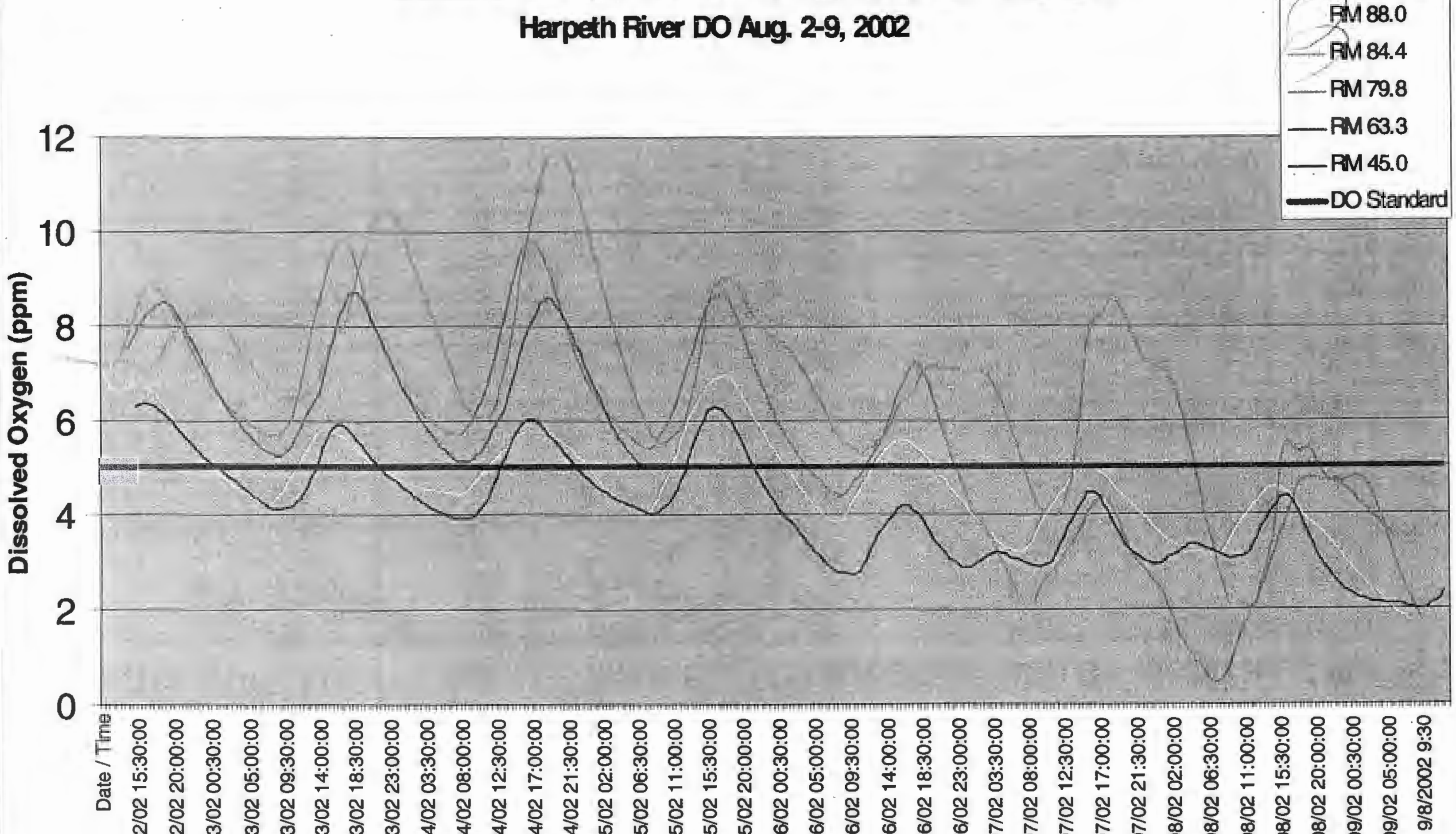
PERIOD	NUMBER OF RECORDS	7Q10 FLOW (cfs)	NPDES PERMITTED FLOW (cfs)
Annual	32	0.7	18.6
January	33	37	18.6
February	32	94	18.6
March	32	90	18.6
April	32	56	18.6
May	32	18	18.6
June	32	4	18.6
July	32	1.3	18.6
August	32	0.9	18.6
September	32	1.0	18.6
October	33	1.2	18.6
November	33	3	18.6
December	33	11	18.6

TABLE SUMMARY OF MONTHLY ANALYSIS

PERIOD	AVERAGE MONTHLY FLOW RETURN PERIOD (yrs)	
	20 year (cfs)	10 year (cfs)
January	15	126
February	186	206
March	169	248
April	77	97
May	24	31
June	12	21
July	4	5
August	2	4
September	1.3	2
October	1.1	3
November	7	14
December	44	75

Note: Two other NPDES Discharges, Lynwood and Cartwright Creek Utilities are permitted for approximately 1 cfs downstream from Franklin.

TDEC DIURNAL DISSOLVED OXYGEN STUDY RESULTS AUGUST 2002

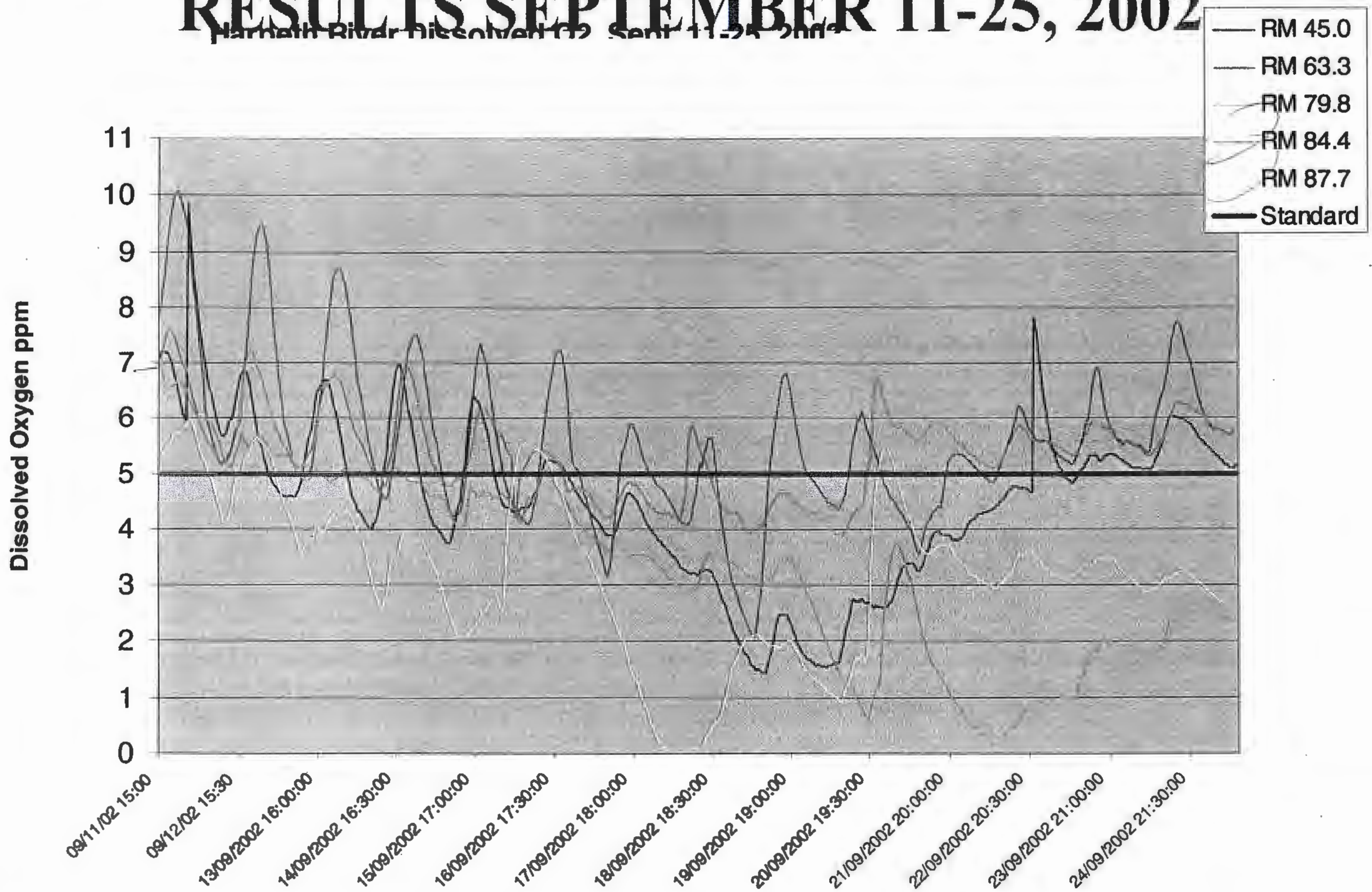


Flow range coming to Franklin POTW – 3 to 4.5 cfs. Downstream from Franklin POTW – 11 to 14 cfs

Estimated Effluent Percentage Downstream Using POTW Flow of 3 mgd – 33% to 42%

Estimated Effluent Percentage Downstream Using POTW Flow of 6 mgd – 66% to 84%

TDEC DIURNAL DISSOLVED OXYGEN STUDY RESULTS SEPTEMBER 11-25, 2002

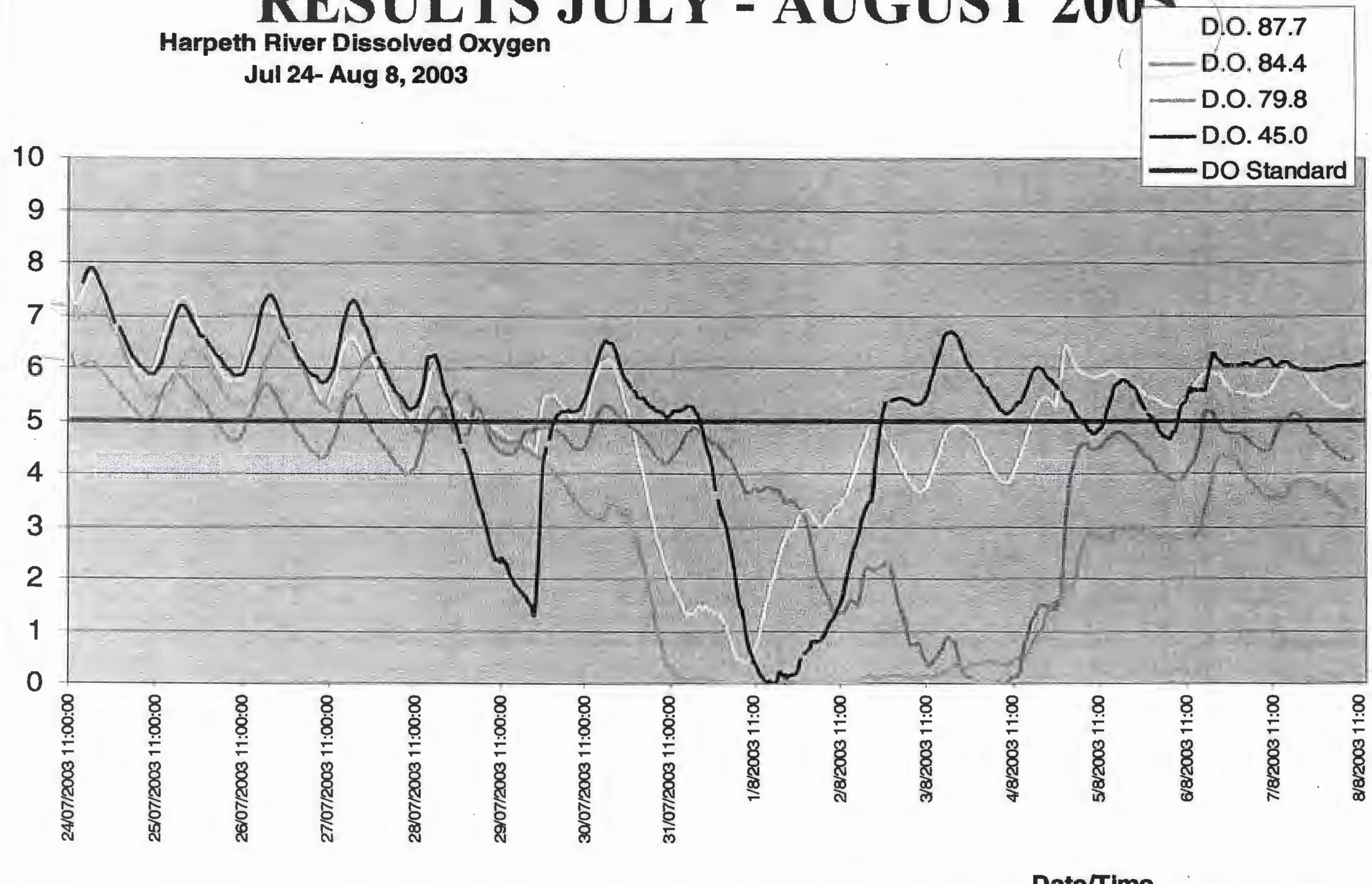


Flow range coming to Franklin POTW – 2.6 to 127 cfs. Downstream from Franklin POTW – 10 to 135 cfs

Estimated Effluent Percentage Downstream Using POTW Flow of 3 mgd – 3% to 49%

Estimated Effluent Percentage Downstream Using POTW Flow of 6 mgd – 7% to 73%

TDEC DIURNAL DISSOLVED OXYGEN STUDY RESULTS JULY - AUGUST 2003

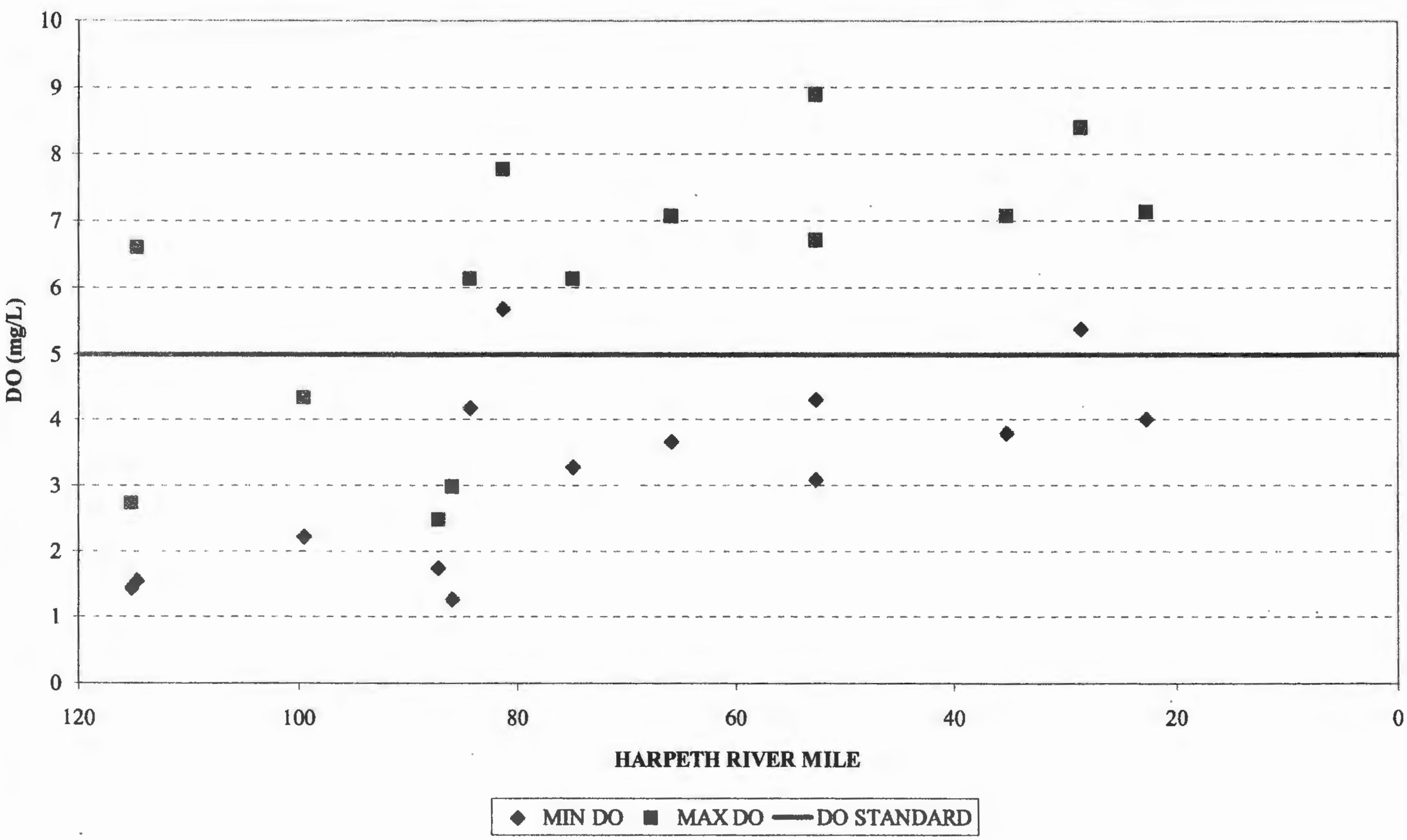


Flow range coming to Franklin POTW – 9 to 82 cfs. Downstream from Franklin POTW – 22 to 105 cfs

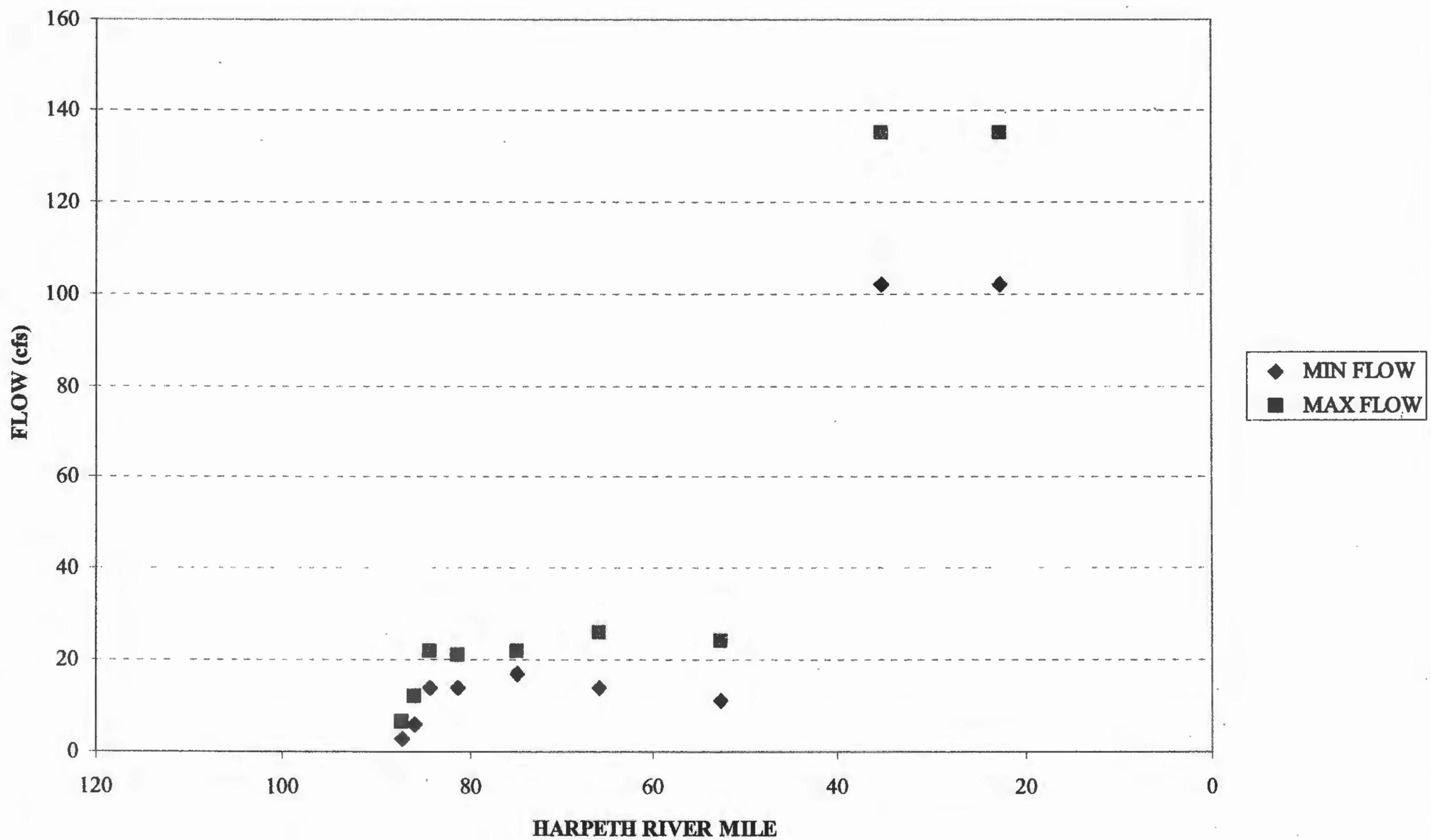
Estimated Effluent Percentage Downstream Using POTW Flow of 3 mgd – 4% to 21%

Estimated Effluent Percentage Downstream Using POTW Flow of 6 mgd – 9% to 42%

HRWA & TDEC DISSOLVED OXYGEN DATA AUGUST-SEPTEMBER 2006



FLOW DURING HRWA STUDY
AUGUST-SEPTEMBER 2006



SIMPLE MASS BALANCE

- Assumptions
  - **$CBOD_u:BOD_5 = 5.4$**
  - **Temperature = 25 °C**
  - **Franklin POTW Effluent**
    - **$BOD_5 = 5$ mg/L**
    - **TKN = 1 mg/L**
    - **DO = 85% of saturation**
    - **DO = 7.0 mg/L**
    - **Flow = 12 mgd permitted**
  - **Background, Harpeth River**
    - **$CBOD_u = 1$ mg/L**
    - **TKN = 0.42 mg/L**
    - **Flow = 0.3 cfs (7Q10)**
    - **Flow = 0.19 mgd (7Q10)**
    - **DO = 6 mg/L**
- Franklin POTW
  - **Oxygen Demand = 3,159 lb/day**
  - **Oxygen Addition = 701 lb/day**
- Background
  - **Oxygen Demand = 4.72 lb/day**
  - **Oxygen In the River = 9.5 lb/day**
- Oxygen Deficit = 2,453 lb/day
- Flow required to meet effluent demand:
  - **Assuming 6 mg/L in the River**
    - **96 cfs**
  - **Assuming 5 mg/L in the River**
    - **142 cfs**

REAERATION

- **Reaeration depends upon turbulence, primarily provided by elevation changes.**
- **The amount of time a segment of water is exposed to elevation changes is critical**
- **The Harpeth River is a pool and riffle stream**
  - The riffle areas are the primary means of natural in-stream reaeration due to the turbulence
  - However, the time spent by any slug of water in the Harpeth River is primarily in pools.
- **Increasing the flow of the River increases the effects of reaeration**

WATER WITHDRAWAL

- **Effects of Water Withdrawals on Reaeration**
  - Decreases the turbulence across riffle areas
  - Increases the time across riffle areas
  - Increases the length of time for a slug of water to pass through a pool
  - Net change is a decrease in the Harpeth River's ability to physically add oxygen
- **Effects of Water Withdrawals on SOD**
  - With less water in the river bed, the effects of SOD are increased because more of the water column can be influenced

EPA MODEL – NON-POINT AND POINT SOURCE REDUCTIONS

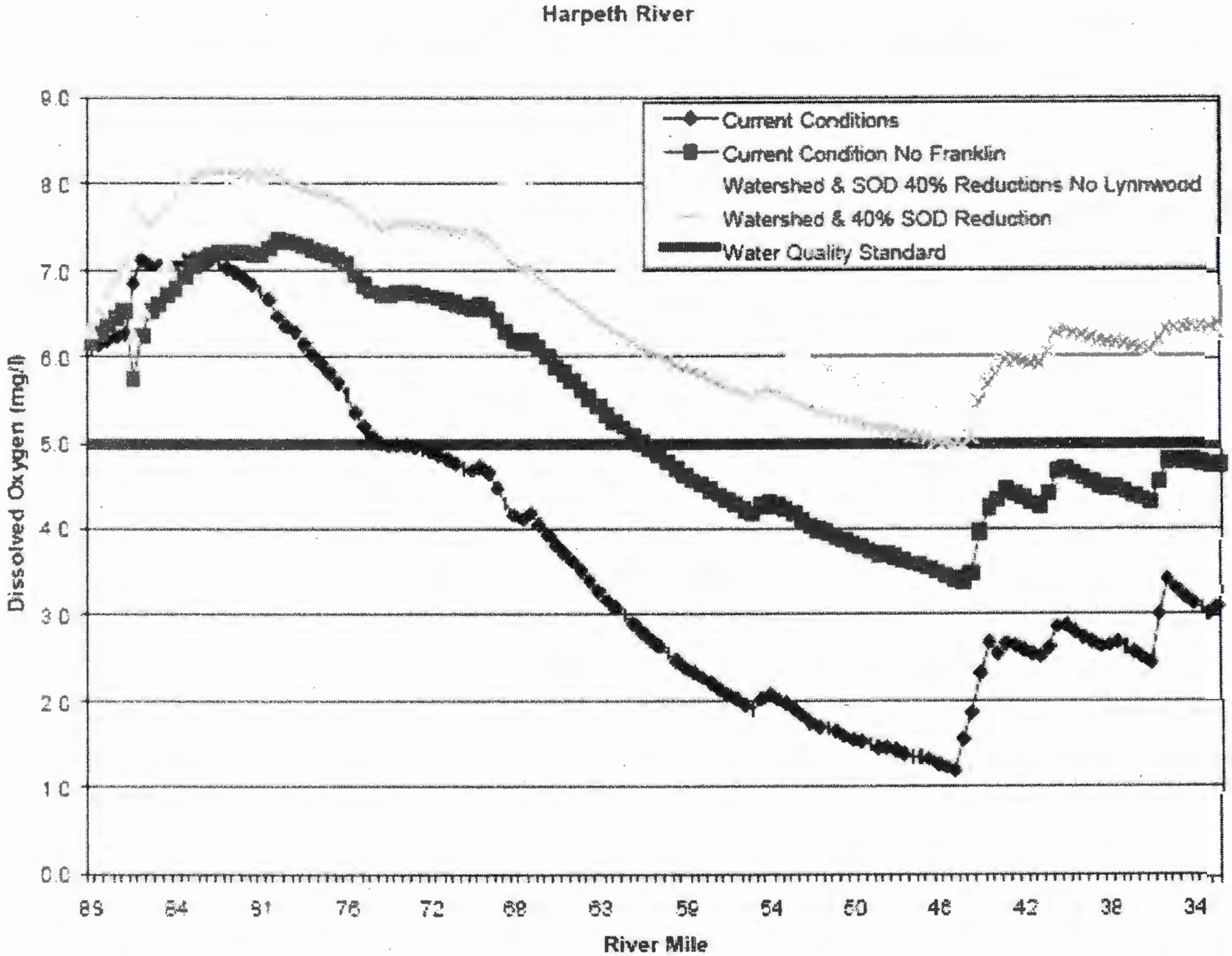


Figure 16 Predicted DO levels versus Pollutant Reduction Scenarios at Critical Conditions

EPA – FRANKLIN SCENARIOS

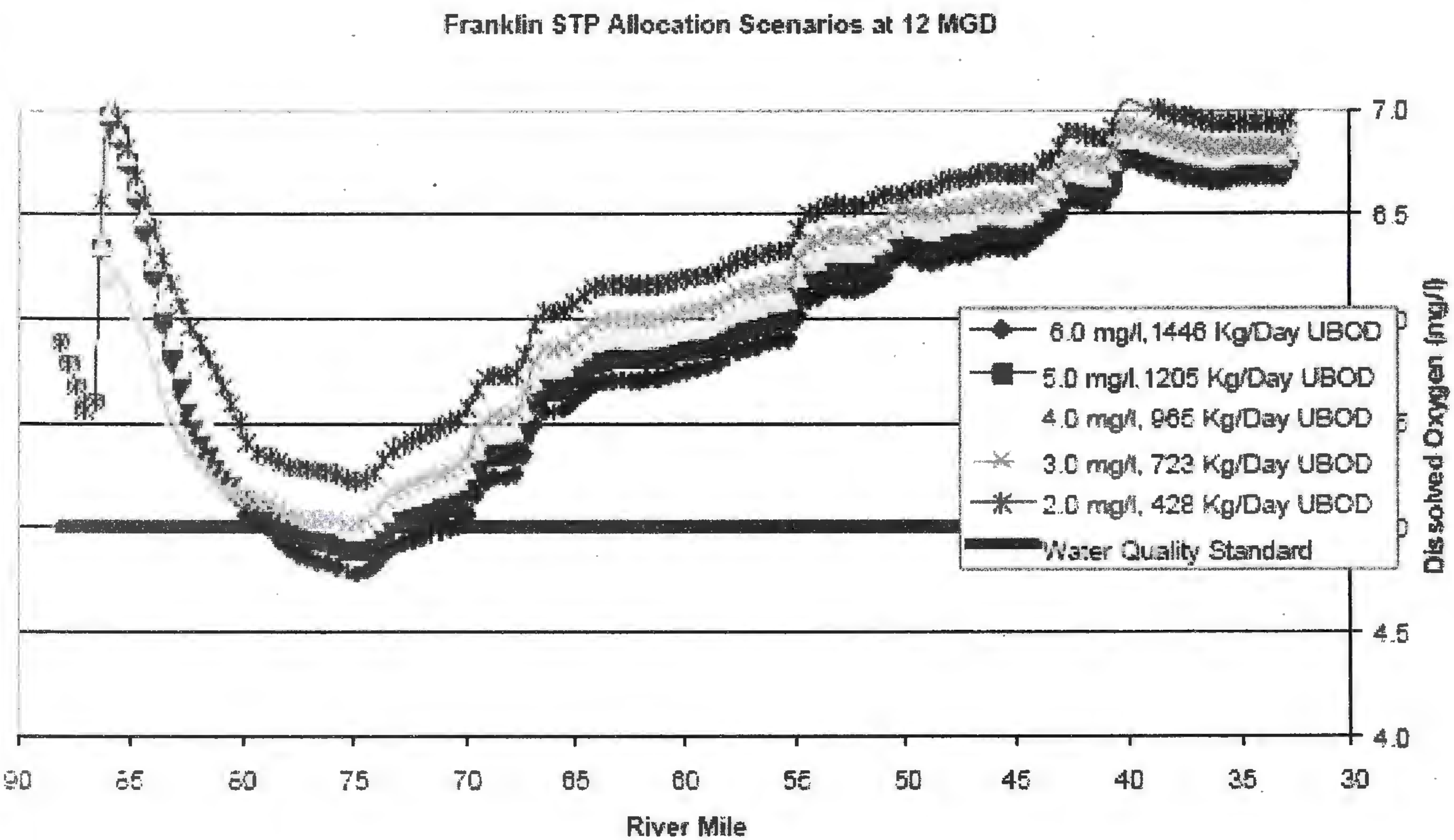
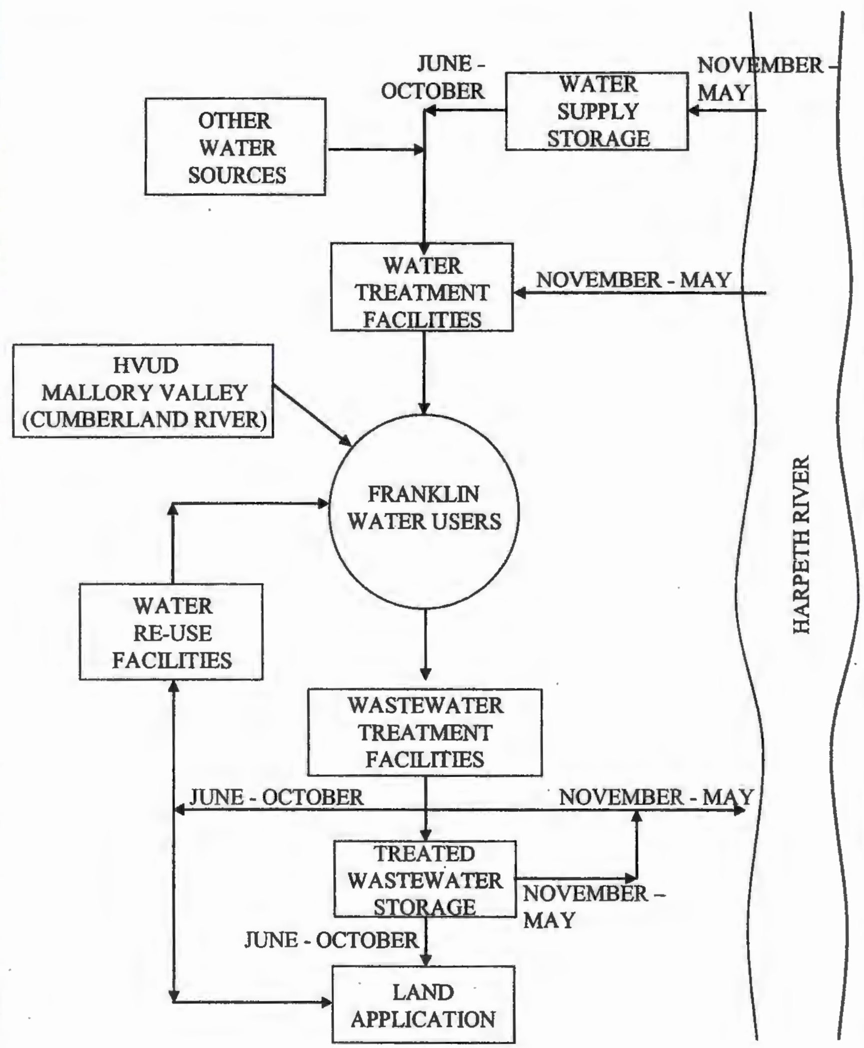


Figure 18 Predicted DO levels versus Franklin STP Treatment Levels at Critical Conditions

PROBLEM IDENTIFICATION

1. Foremost is that the natural flows in the Harpeth are not sufficient during low-flow warm months from June through October to assimilate the current effluent discharges to the River
2. Water withdrawal exacerbates the problems downstream
3. EPA Model Assumed 6 mg/L of DO in the River coming to the Franklin POTW and still showed violations of the water quality standard
4. Data collected in 1987, 2000, 2002, 2003, and 2006 showed violations of the DO water quality standard



AquAeTer

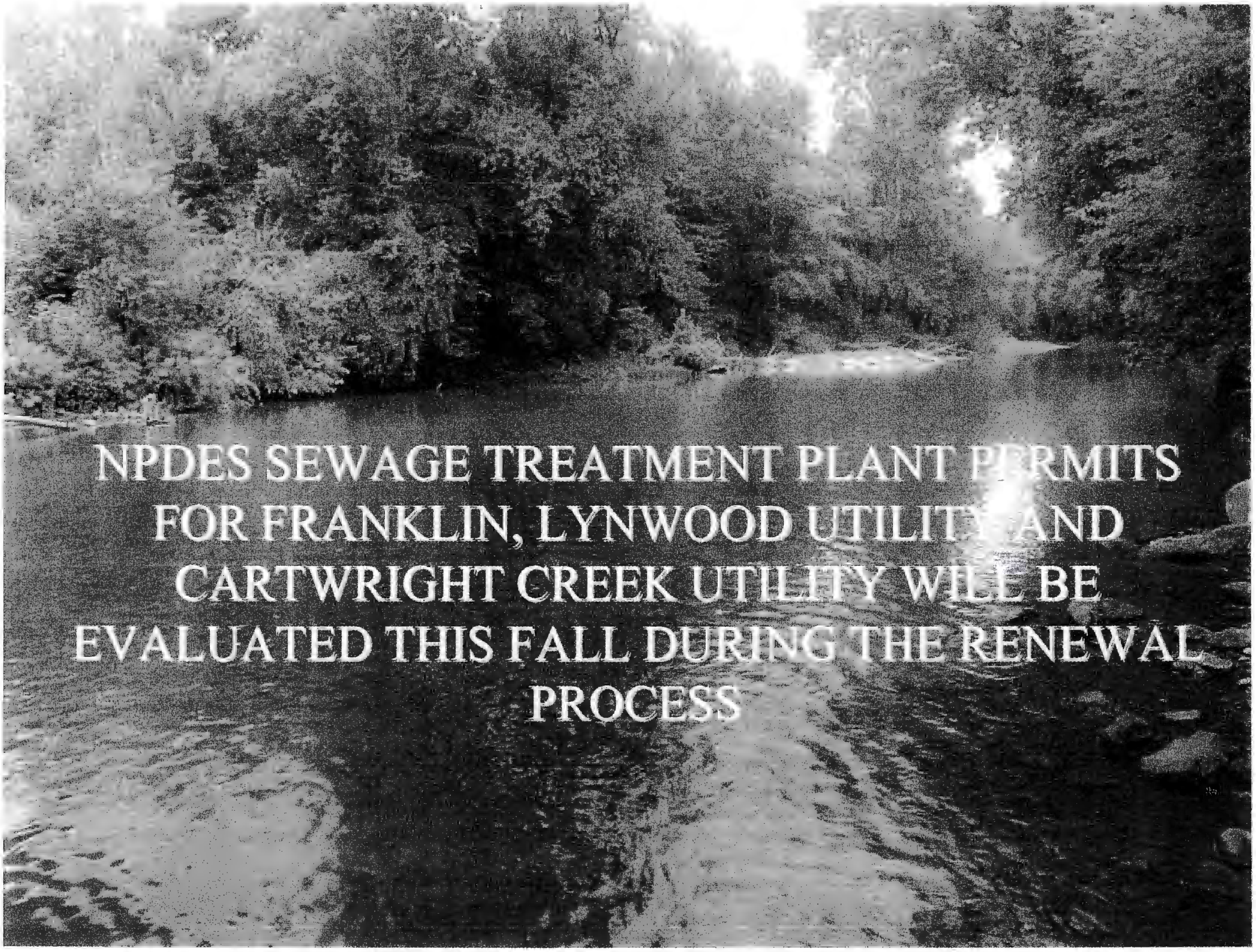
CLIENT: HRWA
LOCATION: Harpeth River
PROJECT/FILE: 061512

optimizing environmental resources | water. air. earth

FIGURE 1
SCHEMATIC OF
WASTEWATER ALTERNATIVES

OPTIONS

1. **No discharges to the Harpeth River during summer months**
   a. **Hold and Release;**
   b. **Water Reuse, either for water supply or irrigation; or**
   c. **Pipe to a larger stream – Cumberland River or to Harpeth at Kingston Springs.**
2. **Carbon or RO at end of pipe for all dischargers on the Harpeth River**
   a. For Franklin, $5 million to $10 million capital;
   b. For Franklin, $1 million to $2 million added operating expenses per year;
   c. **Present Worth = $16.5 million to $33 million**
3. **Reaerate the River at strategic locations downstream from Franklin**
4. **Consider Regional Water Supply and Treatment for Williamson County**
5. **Water withdrawals from the Harpeth should be limited during warm-weather months from June through October**
6. **Improve water quality in upper Harpeth River watershed**
7. **Build an upstream reservoir on the Harpeth or a tributary to provide additional flow of about 100 cfs daily during the summer months**
8. **Investigate the possibility of using other streams, such as, the West Harpeth, to discharge a portion of the Franklin POTW effluent**
9. **Change the Discharge location on the Harpeth River**


NPDES SEWAGE TREATMENT PLANT PERMITS
FOR FRANKLIN, LYNWOOD UTILITY AND
CARTWRIGHT CREEK UTILITY WILL BE
EVALUATED THIS FALL DURING THE RENEWAL
PROCESS

From: "Dorie Bolze" <doriebolze@harpethriver.org>
To: "'Gary Davis'" <Gary.Davis@state.tn.us>, <wade.murphy@state.tn.us>, <voj...
Date: 4/25/2008 3:01 PM
Subject: THANK YOU and I think you have my copy of the Frnaklin STP NPDES permit
Attachments: DO 2006 report Final 3 6.pdf

Hello Gary, Wade, and Vojin,

THANK you for your time yesterday to talk about the Harpeth river Dissolved oxygen issues, the TMDL, and the 3 NPDES permits that are up for renewal. We really appreciated it. I will get you the 2007 DO Study on the Harpeth in draft when we get it clean up.

Here is the 2006 Dissolved Oxygen study that has all the D.O. data in it on the Harpeth except the EPA data from their TMDL. You can see that in the other report I sent and it is in the TMDL.

Tel'd: 4-25-08
Don't have it

GARY--- I think you ran off with my print out of Franklin's NPDES permit. Can you pull it out of your pile-or am I losing my marbles! I'd love it back since it has notes on it, but if it has vanished I'll print another at some point.

Dorie

Dorene Bolze

Executive Director

Harpeth River Watershed Association

P.O. Box 1127

1164 Columbia Avenue

Franklin, TN 37065

615 790-9767 ext. 101

615 479-0181 mobile

<http://www.harpethriver.org/> http://www.harpethriver.org

Working Together to Protect the Harpeth River and Provide Expertise on Statewide Conservation Policy

From: Gary Davis
To: Bolze, Dorie
Date: 4/9/2008 1:30 PM
Subject: Re: Harprth npdes permits

Dorie
We are set for Thu Apr 24 (9:30 to 11:30) @ L&C Annex 6th Floor Large Conf. Rm. Please confirm mtg schedule okay.
Thanks
Gary

>>> Dorie Bolze <doriebolze@sprintpcs.com> 4/8/2008 5:24 PM >>>

hey gary

great to talk to you today.

How about checking out these dates to meet to talk about 3 npdes stp permits and tmdl and DO.

april 24, 25, 29, 30.
any time.

Dorie

Dorie Bolze
Executive Director
Harpeth River Watershed Ass'n
615 790-9767 office (ext. 1)
615 479-0181 mobile
from wireless

ADDENDUM TO RATIONALE

Franklin STP

NPDES PERMIT No. TN0028827

Permit Writer: Gary Davis

This Addendum to Rationale presents the permittee's written comments concerning the draft permit, followed by the division's responses provided in **bold *italics*** font. Also, written draft permit comments were provided by the Harpeth River Watershed Association (HRWA), Tennessee Clean Water Network (TCWN) and USEPA, which are likewise addressed. This "Addendum to Rationale" provides the basis for augmenting the draft permit's "Rationale" and finalizing the permit. This Addendum to Rationale includes references to the division's August 31, 2010 Public Hearing – Notice of Determination (NOD), which is presented in this document following the Rationale. The Public Hearing served for receiving comments regarding the draft permits and their renewals for Franklin STP (TN0028827), Lynwood Utility Corp. STP (TN0029718), and Cartwright Creek, LLC – Grassland STP (TN0027278).

Permittee's Comments (Cover Letter)

The permittee's draft permit cover letter comments are presented in Attachment AD-1. The permittee's draft permit comments attached to the November 30, 2009 cover letter are presented subsequently, along with the division's responses.

Several of the draft permit conditions make reference to the September 2004 Organic Enrichment/ Low Dissolved Oxygen, TMDL study developed by EPA. Franklin has made repeated objections to these findings and has submitted comments indicating our objections. We continue to note our objections and disagree with the findings and the use of these findings for developing the proposed permit limits. In addition to our previously submitted comments, we feel the recent developments concerning pollutants from the Egyptian Lacquer plant and the resulting low dissolved oxygen in Liberty Creek at the Harpeth River in that vicinity may play an important role in understanding the underlying causes of dissolved oxygen levels in the Harpeth River.

The City of Franklin has recently entered into a contract with CDM to provide an Integrated Water Management Plan (IWMP). We anticipate this to be a very detailed and extensive plan, and we will gather input from a variety of stakeholders. Several of the proposed permit provisions will be identified and more fully developed and addressed during the IWMP process. The City of Franklin will spend hundreds of thousands of dollars on the IWMP. We are confident that the results of this plan will greatly improve the water quality within the Harpeth River. Many of our comments to the permit refer to Franklin's proactive approach in developing the IWMP.

Key failings

Division's Response (Permittee's Cover Letter Comments)

"perceived" shortcomings

The division acknowledges that numerous organizations have presented comments regarding EPA's 2004 TMDL shortcomings. The division has ~~taken a broad-based~~ approach for the integration of the TMDL requirements, and has incorporated several flexibility features, e.g., using WWTP controls/effluent limits/corresponding instream data collection requirements that can used by the permittee to demonstrate that more effective water quality improvements should be achieved. Such results will allow the division to make permit modifications if proposed/justified by the permittee based on actual empirical data. The division is aware of adverse water quality impacts due to non-point receiving stream inputs, including those associated with the Egyptian Lacquer facility.

doesn't add much meaning

The division is in favor of the permittee's IWMP approach for defining cost-effective environmental control solutions for the complex receiving stream problems. As such, the final permit includes flexibility to allow for incorporating final permit limitations/requirements modifications/adjustments pursuant to division-approved IWMP findings as proposed by the permittee based on actual data/evaluations/investigation results.

Permittee's No. 1 Comment

Permit Cover Sheet: The proposed time period for the new permit is approximately two years. We request that the permit expiration date be extended to a minimum of three years, with a preference of five years.

Division's Response For Permittee's No. 1 Comment

The division conducts water quality monitoring, assessing and permitting on a 5 year watershed cycle.

~~The division would also prefer the maximum five year duration for the new permit.~~ However, due to permitting for other permittee's within the Harpeth River watershed, the permit expiration date will remain November 30, 2011.

Permittee's No. 2 Comment

Section 1.1 – Numerical and Narrative Effluent Limitations: The rationale and justification for the addition of CBODu is unclear. The permit rationale (R 7.2) indicated the 2004 TDML (should be TMDL) used a relatively high treated effluent ultimate BOD for its modeling. It is assumed using the high ultimate CBOD is a more conservative approach to protect the water quality within the receiving stream. While it may be to Franklin's advantage to provide additional monitoring of ultimate CBOD in the receiving stream, we do not believe the cost and variability in this testing procedure is warranted. We may determine that ultimate CBOD analysis may be necessary during the evaluation of the alternatives within our IWMP. However, at this time, we do not believe there is justification for this requirement and request that it be removed from the permit.

Division's Response For Permittee's No. 2 Comment

Long-term (ultimate) CBOD testing provides ~~valuable~~ information regarding the permittee's Outfall 001 treated effluent's potential impact on the receiving stream's dissolved oxygen. The permittee's CBODu testing procedure needs to be structured for defining both the time required to achieve the maximum total carbonaceous biochemical oxygen and corresponding CBOD5 result. Major differences in the instream dissolved oxygen demand (and residual dissolved oxygen) would be expected at the same CBODu/CBOD5 ratio, e.g., treated effluent samples having its CBODu occurring in 20 days verses 90 days. As such, the time element for the CBODu defines the actual carbonaceous biochemical oxygen demand kinetics and how quickly the instream oxygen demand will be exerted.

I don't follow this.

How will this permit requirement relate to the D.O. WQ standard? Is this for DO modeling?

Yes

Quarterly CBODu monitoring had been included in the draft permit requirements to allow the permittee/consultant and the division to determine if seasonal CBODu variations occur. However, after further division consideration, the permit has been finalized to include annual CBODu monitoring, with sampling occurring during the summer season (May 1 to October 31), since this is the critical receiving stream low-flow period.

Permittee's No. 3 Comment

Section 1.1 – Numerical and Narrative Effluent Limitations - Total Nitrogen: The monthly average amount and pounds per day for total nitrogen is 377 pounds during the summer period, however, there is a subnote that requires the total nitrogen average permit limit be less than 290 pounds per day. We request that this annual total nitrogen permit limit of 290 pounds per day be removed from the permit at this time. We recognize the need to have a TMDL driven mass limit within our permit. However, we believe this can be deferred until the IWMP and our Nutrient Management Plan have been developed and implemented. We request inclusion of the 377 pounds per day limit only.

Division's Response For Permittee's No. 3 Comment

The finalized permit provides major permittee flexibility via its Nutrient Management Plan/IWMP to identify/implement cost-effective solutions for the receiving stream's low-flow summer water quality problems (nutrients - resulting algal growth, and low dissolved oxygen). The annual average 290 lb/day total nitrogen discharge limit was used for finalizing the permit, since it is the TMDL value. The 377 lb/day total nitrogen limit for the summer months (May 1 to October 31) is being retained from the current permit.

The division understands that a more effective receiving stream water quality solution may require future permit modification/adjustments, based on additional actual Outfall 001 discharge, receiving stream data, and investigational results.

Permittee's No. 4 Comment

Section 1.1 – Numerical and Narrative Effluent Limitations – Total Phosphorous Summer Period: The proposed permit requires a 3 mg/L monthly average concentration for total phosphorous. Rationale noted in Section R 7.5 notes that the Division considers that the permittee has demonstrated its ability to technically achieve the monthly average treated effluent total phosphorous of 3 mg/L for the summer months due to the plant's ability to meet this limit as noted on the permittee's DMR data. While the plant consistently achieved a total phosphorous level of less than 3 mg/L, there have been several occurrences during the summer months that would have resulted in violation of this permit. Since there is no technical data to support a 3.0 mg/L limit other than past performance of the plant, we propose that the limit be set at 5 milligrams per liter. We would propose that one of the targeted goals to be included in the Nutrient Management Plan and the IWMP is to achieve a total phosphorous concentration of not more than 3 mg/L. Consequently, we propose this limit be raised to 5.0 milligrams per liter.

Division's Response For Permittee's No. 4 Comment

The division agrees with the permittee's proposed limit and has finalized the permit to include an Outfall 001 total phosphorus limit of 5.0 mg/L for the summer months (May 1 to October 31). Also, the final permit also includes the permittee's proposed targeting goal of 3.0 mg/L total phosphorus (summer months) to be addressed as part of its Nutrient Management Plan/IWMP.

The division expects results from the Nutrient Management Plan/IWMP evaluations to be useful in defining the limiting nutrient (total nitrogen or total phosphorus) and ratio warranted for reducing the potential for instream algal growth.

Permittee's No. 5 Comment

Section 1.1 – Numerical and Narrative Effluent Limitations – Copper and Silver: The proposed permit includes daily maximum levels of 0.075 and 0.10 for copper and silver respectively. The proposed effluent limits do not indicate what the units are for these parameters. We have assumed that they are milligrams per liter. The rationale for the total copper and silver limits is shown in R 7.6 and R 7.12. The proposed limits are apparently based on the Division's reasonable potential water quality evaluation. It is noted, however, that R 7.12 of the rationale states that the summary of the Semi-Annual Report data does not indicate that the potential exists for water quality criteria for any of the metals in toxic consideration to be exceeded. Therefore, we are unclear as to what the rationale would be for adding these metal limits to the new permit. We request that the total copper and silver limits be removed from the draft permit.

We also request that the pass-through limits we received on September 21, 2009, from Ms. Jennifer Dodd be reviewed and compared to the worksheets shown in the draft permit. There are a few inconsistencies between the pass-through limits as contained in the September 21st letter and the information shown on page R-34 of 37 in the draft permit. In addition, we are confused between the information shown on page R-34 and R-37 of the draft permit. Both of these appear to be pass-through calculations. However, the information shown on R-37 had some slight differences from the information contained on R-34. We request that you review this information and provide better clarity on the proposed pass-through limits and the information shown on pages R-34 and R-37.

Division's Response For Permittee's No. 5 Comment

Pursuant to a December 10, 2009 USEPA draft permit email comment, as discussed subsequently in this Addendum to Rationale, the division requested and received supplemental permit renewal information Outfall 001 treated effluent metals data from the permittee (including copper, silver, and selenium results) as provided in Appendix AD–1A). Based on the permittee's supplemental information, the division completed the reasonable potential evaluation (also included in Appendix AD-1A) and made the following determinations for finalizing the permit:

1. ***The Outfall 001 treated effluent silver monthly average and daily maximum limits are set at 0.010 mg/L, with semiannual monitoring based on composite samples.***
2. ***Outfall 001 discharge copper limits are not required and the permittee must continue to complete its pass-through monitoring pursuant to its pretreatment program.***
3. ***For the Outfall 001 treated effluent, selenium limits are included (monthly average at 0.005 mg/L and daily maximum 0.019 mg/L).***

Revised pass-through limits will be issued to the permittee, consistent with the final permit requirements. The information provided in the Rationale p. R-34 presents the pass-though reasonable potential evaluation and was used for comparison with effluent quality per EPA's 40 POTWs survey and considered the permittee semi-annual monitoring results as presented on p. R-35. The reasonable potential evaluation presented on p. R-37 and as supplemented in this Addendum to Rationale Appendix AD-1A, allowed the division to consider both the pass-though monitoring results and permit renewal application data, with any updates. At times some minor differences exist, e.g., due to differing datasets being used.

Pursuant to the permittee's No. 5 comment and further division reasonable potential review of information provided on p. R-37, the new permit includes Outfall 001 total cyanide limits of 0.00478 mg/l for the monthly average with a daily maximum of 0.0205 mg/l.

Permittee's No. 6 Comment

Section 1.1 – Numerical and Narrative Effluent Limitations: Over the past several years, the City of Franklin has expanded its reclaimed water system. The City has continued to keep TDEC involved of these efforts and Franklin has been a leader within the state of Tennessee in the development and regulation of reclaimed water systems. We are convinced that the Harpeth River Watershed has benefited from our proactive approach to the use of reclaimed water. The Franklin Reclaimed Water System has expanded to include reuse by industrial customers, commercial developments, golf courses, recreational areas, residential developments both individual properties and common areas within these developments, and other non-potable uses.

We are in agreement with the limitations proposed and most of the narrative limitations proposed in Section 3.9. We are, however, concerned with the addition of the narrative requirements that application rates shall be restricted, such that nitrogen uptake by the receiving crop cover is sufficient during all months of the year to prevent the reuse water from causing the ground water underlying the application sites to exceed State groundwater criteria for nitrates. We believe this new requirement is unnecessary and excessive. The numerical limits in our permit are very restrictive and limit the nitrogen that can be contained in our reclaimed water. In addition, there are dozens of sites with a variety of cover crops where the reclaimed water is presently utilized. With the continued development of the reclaimed distribution system, we fully expect that the number of sites could increase drastically during the next dry weather period. The vast majority of these locations are turf grass-type cover crops and the application rates are limited to only that amount that is required for adequate irrigation of the turf grasses. Consequently, we request that the narrative limitation related to the application rates be removed from this permit.

Division's Response For No. 6 Comment

The division has include the "... nitrogen uptake by the receiving crop cover is sufficient during all months of the year to prevent the reuse water from causing the ground water underlying the application sites to exceed State groundwater criteria for nitrates" provision in other POTW treated effluent reuse NPDES permits. The division agrees that the permittee has to achieve very high quality effluent ammonia-nitrogen and total nitrogen limitations. As such, this provision is being removed from the permit, however for cause the division may reopen the permit and include comprehensive application criteria. If the permit is reopened for modification, applicable public participation measures would be used.

Permittee's No. 7 Comment

Section 1.1 – Numerical and Narrative Effluent Limitations Suspended Solids Summer Period: The proposed monthly average concentration limits for suspended solids is 30 milligrams per liter. As noted in the rationale in 7.3, water quality regulations require a 30 milligram per liter TSS limit. The Division has proposed to reduce this limit to 10 milligrams per liter for the summer period. There is no basis for this permit limit reduction nor does the water quality criteria and regulations for the state of Tennessee require the reduction to 10 mg/L. As noted, Franklin Wastewater Treatment Plant does have advanced filtration for the removal of suspended solids from the effluent. This in itself is not sufficient justification in our opinion for the suspended solids limits to be decreased from its current value. We request the total suspended solids limit be maintained at 30 milligrams per liter. It is noted, however, in order to comply with other permit conditions, the City of Franklin will have to maintain its advanced filtration process to achieve other permit limits and will achieve total suspended solids limit less than 30 milligrams per liter.

Division's Response For No. 7 Comment — This is one we could yield on.

The division considers the more stringent effluent 10 mg/L TSS limit for summer conditions to be appropriate due to the following rationale.

The state water quality standards require regulation of activities such that existing water quality levels are maintained or improved.

The potential for nutrient feedback to the water column via suspended solids settling/accumulation/biodegradation in the downstream receiving stream pools under low-flow summer conditions, ~~and the permitting need to insure that tertiary filtration will continue to be used~~. The permittee's permit renewal application presents the wastewater treatment plant's design capacity for TSS removal at 95%. For the summer average influent TSS value of 212 mg/L (as shown the Rationale p. R-24), this removal results in an effluent TSS equal to 10.6 mg/L, which the permittee has also demonstrated to be achievable. (The effluent TSS secondary treatment standard 30 mg/L requirement is based on 85% TSS removal using an influent TSS of 200 mg/L.)

is an issue of

These are fighting words, we don't need them.

TMDL

SOD

What we could offer here, since this is to a large degree, a technology issue versus a concrete WQ issue, is to explicitly state that violation of the 10 mg/L is NOT a violation of the permit without corresponding ~~documentation~~ ~~of [illegible] limit neglect~~.

Permittee's No. 8 Comment

Section 3.7 – Receiving Stream Monitoring/Reporting: The proposed permit adds additional receiving stream monitoring or reporting requirements. Specifically, the permit requires supplemental in-stream monitoring and diurnal investigations at various locations within the receiving stream. The receiving stream investigations are described in Attachment 1 of the draft permit. As we have previously indicated, the City of Franklin is in the very early stages of an IWMP. This investigation will take several years to complete and we believe will have a positive impact on the watershed in the Franklin area. Inasmuch as the City of Franklin had previously initiated the IWMP without a requirement or mandate from TDEC, we request greater flexibility in the additional in-stream monitoring and the requirements of identifying and implementing advanced methods of improving receiving stream water quality as defined in the permit.

Attached to our comments is the detailed Scope of Work, Work Flow and Schedule for the first phase of the IWMP. We request that the provisions contained in Attachment 1 of the draft permit, particularly those related to the diurnal investigations and the implementation of advanced methods for improving receiving stream water quality be deleted from the draft permit and replaced with conditions and requirements that match those identified in our scope of work Attachment. Franklin is very committed to the development of the IWMP and believes this is a much better and more cost-effective approach to improving the water quality of our watershed, and we suggest that our proposed IWMP Work Plan be referenced in the draft permit as opposed to the language proposed by the Division in Attachment 1.

Division's Response For No. 8 Comment

The division is in favor of the permittee's progressive step forward by the development of its IWMP and looking for cost-effective receiving stream water quality improvements. ~~However, improvements in the receiving stream's water quality must occur within the scope/duration of the proposed new permit.~~ why? To address third party concerns.

The division concurs with the permittee's request for including greater flexibility in the proposed permit requirements associated with additional instream monitoring and identifying and implementing advanced methods for improving receiving stream water quality. As such, the permittee will have up to three months from the permit's effective date to propose modifications to the provisions addressed Attachment 1. Should the division agree in writing with the permittee's written Attachment 1 modifications request, then the permit will be reopened and modified. Such a modification will be subject to applicable permit public participation. better to fix now than to modify permit

How can we say that?

Yikes!

Permittee's No. 9 Comment

Section 3.8 – Nutrient Management Plan/Reporting: The proposed permit requires the development of a Nutrient Management Plan (NMP) as described in Attachment 2. The City of Franklin is continually looking for enhancements to help control the effluent discharge from the treatment plant. Various operational enhancements and changes and other alternatives continue to be evaluated for the most cost-effective solution to help achieve a very high quality effluent. We request that the Nutrient Management Plan, as presented in Attachment 2 be deferred in this draft permit, and we will incorporate some of the provisions included in the Division's Attachment 2 into our IWMP. We believe it is important for the goals for the watershed to be established by the stakeholders and that any water quality improvement plan that will be developed by the City of Franklin should incorporate those goals, along with the suggestions included in Attachment 2. We request that the Nutrient Management Plan, as proposed in Attachment 2, be incorporated into our future phases of the IWMP and be removed from the permit at this time.

Division's Response For No. 9 Comment

The division anticipated that improvements in the receiving stream water quality would require a coordinated effort involving requirements presented in Attachments 1 and 2, and that would be included in the permittee's IWMP evaluations. The division considers the permitting flexibility/provisions afforded for the permittee's compliance with the Attachment 1 (as presented by the division's above response for the permittee's No. 8 comment) to also be applicable to the Attachment 2 requirements. Therefore, the permittee will have up to three month from the permit's effective date to propose modifications to the provisions addressed Attachment 2. Should the division agree in writing with the permittee's written Attachment 2 modifications request, then the permit will be reopened and modified. Such a modification will be subject to applicable permit public participation.

Harpeth River Watershed Association (HRWA) Comments

HRWA's written comments are provided in Attachment AD-2. The attachments referenced in the HRWA comments are available in the division's permit file. From the HRWA comments the division extracted the following brief topical summary as related to the permittee's (Franklin STP TN0028827) draft permit, with the corresponding division response.

The Harpeth River's dissolved oxygen is below the state water quality standard of 5.0 mg/L above and below the discharges from the three wastewater treatment plants during effluent dominated low-flow summer conditions, including downstream sections classified as Exceptional Tennessee Waters. An inaccurate 2004 TMDL was developed by the USEPA and used by the division to define discharge requirements for the proposed new permits. Therefore, additional load reductions are warranted for the discharges, beyond those presented in the three draft permits (Franklin STP TN0028827, Lynwood Utility Corp. STP TN0029718, and Cartwright Creek, LLC – Grassland STP TN0027278).

Division's Response For HRWA Summary

The division did incorporate the requirements included in the USEPA's 2004 TMDL in the proposed draft permits, and included key investigational/implementation requirements for better understanding the nature of the receiving stream's dissolved oxygen encumbrances and enhancement opportunities. For example, for the Franklin STP TN0028827 permit, the draft permit was finalized to define the actual Outfall 001 treated effluent CBODu, develop/implement a receiving stream monitoring/reporting program

or participation in IWMP development

(Attachment 1), and a nutrient management plan (Attachment 2). The new permit provides for a pragmatic/empirical approach which the division considers essential for the development/implementation of elements needed for enhancing the receiving stream's dissolved oxygen during the low-flow summer conditions.

Franklin STP's implementation of its Integrated Water Management Plan (IWMP) should result in further consideration of the impacts from the numerous non-point sources and the direct dischargers and identify upgrading/enhancing options for improving the instream dissolved oxygen during low-flow summer conditions. As such, upgrade options can be assessed in term of the actual receiving stream's capacity. The division has suggested to the downstream dischargers (Lynwood Utility Corp. STP TN0029718 and Cartwright Creek, LLC – Grassland STP TN0027278) that they be involved as possible in the IWMP.

<u>**Tennessee Clean Water Network (TCWN) Comments**</u>

TCWN comments are provided in Attachment AD-3, which also includes Dr. Burkholder comments. From the TCWN comments the division extracted the following brief topical summaries extracted as related to the three permits, with the corresponding division responses. Likewise addressed are TCWN's comments focused on permittee's (Franklin STP TN0028827) draft permit.

<u>**TCWN Summary Comment No. 1**</u>

Due to the low receiving stream natural flow, the three discharges likely cause or contribute to the segment water quality impairments. The draft permits provisions would cause a condition of pollution and do not include the most stringent limits necessary to implement ammonia-nitrogen, total nitrogen, total phosphorus and CBOD5 water quality standards.

<u>***Division's Response For TCWN Summary Comment No. 1***</u>

The division included the USEPA's 2004 TMDL provisions for the necessary controls for the permittees' CBOD5, ammonia-nitrogen, and total nitrogen. The draft permits included total phosphorus limits also for additional nutrients control. Additional permit requirements were included, as noted above in the division's responses to the HRWA comments.

<u>**TCWN Summary Comment No. 2**</u>

TCWN suggested that the permit include "This permit does not authorize discharges that would result in violation of a state water quality standard (TDEC Rules, Chapters 1200-4-3 and 1200-4-4). Such discharges constitute a violation of this permit." Such language allows TDEC to protect water quality if the permit's numeric effluent and monitoring requirements are not sufficient.

<u>***Division's Response For TCWN Summary Comment No. 2***</u>

See division's response to TCWN Summary Comment No. 1 above. The permit standard language ~~[illegible]~~ requires the permittee to comply with all state and federal ~~regulations~~ WQ laws, in section 2.4.2.

TCWN Summary Comment No. 3

TCWN's nutrient contributions comments:

a. Total phosphorus and total nitrogen limits are high compared to levels determined to cause noxious algal blooms (per Dr. Burkholder comments also attached in Appendix AD - 3. It is feasible for each facility to meet lower limits.

b. The draft permits developed using USEPA's 2004 TMDL total nitrogen wasteload allocations as annual average total nitrogen (lbs/day), which results in significant exceedances of loading limits.

c. Numeric total nitrogen and total phosphorus limits need to be established for the entire year. Limiting winter loading important because a portion of the nutrient loads are stored in the streambed sediment and will contribute to summer eutrophication.

d. None of the permits take into consideration inorganic nitrogen or bioavailable organic nitrogen, which are the most important forms of nitrogen in relation to cause of eutrophication.

e. The total nitrogen and total phorphorus limits should be based on analysis of the assimilative capacity of the receiving waters rather than the facilities' demonstrated performance.

f. The division should assess if the application of its 2001 *Development of Regionally-Based Interpretations of Tennessee's Narrative Nutrient Criterion* could better serve to protect the segments water quality.

More stringent numerical limits are necessary for all three STP permits. The state has the authority and responsibility to set effluent limits in compliance with water quality standards per 40 CFR 122.44(d).

Division's Response For TCWN Summary Comment No. 3

The division included the TMDL total nitrogen limits. Additionally, the permits included total phosphorus limits and advanced pragmatic/empirical measures including upstream/downstream diurnal monitoring/reporting requirements in conjunction with other permitting requirements as noted above in the HRWA response, to identify actual effective measures for defining dissolved oxygen improvements.

The division's responses for the above items "a" through "f" and summary comment follows:

a. Many factors can result in algal blooms including the treated effluent total nitrogen and total phosphorus. Other factors include ratio of total nitrogen/total phosphorus, solar radiation and temperature. The instream upstream/downstream diurnal variation results in dissolved oxygen and pH will provide useful information regarding the potential impacts from the dischargers and upgrade options. The IWMP will be focused on defining upgrades for the dischargers and non-point source inputs.

b. The division's understanding is that the 2004 TMDL provided annual average mass loadings. The draft permits include elements for identifying/implementing upgrades for improving the instream dissolved oxygen. The permits will expire in 2011 at which time additional information should be available to make changes in treated effluent limitations/monitoring requirements, if warranted.

c. Annual average total nitrogen treated effluent mass loading limits provides coverage for the permits. The largest discharger's (Franklin STP TN0028827) current permit includes a total nitrogen mass loading limit of 377 lb/day for summer operation, and this value was retained for the new permit. The three permits include discharge total phosphorus limits for summer operation. During winter periods the receiving stream flows are much higher, therefore due to hydraulics reduced streambed sediment accumulation with corresponding transport downstream are expected.

d. The 2004 TMDL presented total nitrogen allocations, which were used for developing the discharge permits. Total nitrogen discharge values automatically limits the inorganic and bioavailable organic nitrogen components. Within the context of the IWMP additional nitrogen species monitoring would be acceptable to the division, if such results could be effective for controlling algal growth.

e. Total nitrogen discharge limits were based on the 2004 TMDL allocations, with the wastewater treatment plant performances being used for the total phosphorus limits. As explained above in response to the HRWA's comments, the division expects the elements included in the permits to allow more specific nutrient limits to be developed in the future.

f. The division considers the application of the 2004 TMDL requirements, with phosphorus limits and permitting elements to provide the most effective method to make water quality improvements.

The division considers the discharge limits and permitting conditions included in the finalized permit to be appropriate for upgrading the receiving stream's water quality.

TCWN Summary Comment No. 4

The definition of "degradation" in Section 4.1 of the permits contradicts the "de minimis" definition in Tenn. R. and Regs 1200-4-3-.04(4). In the rules the cumulative impact can not exceed 10% of the assimilative capacity for *de minimis* determinations unless the Division determines there is a scientific basis demonstrating additional impacts are insignificant. The definition provided in the permits, and all other NPDES permits, can establish a *de minimis* level at 50% of assimilative capacity in direct contradiction to the rules of the Department. The permit language must be altered to "Degradation will not be considered de minimis if 10% of the receiving water assimilative capacity is already being used."

Division's Response For TCWN Summary Comment No. 4

This is the renewal of three existing permits and does not involve new or expanded discharges and the new permit addresses controls necessary to remedy the instream low dissolved oxygen under low-flow summer conditions. The permit's definition for "Degradation" was supplemented to include the TCWN's noted 10% provision as follows: "... (not measurable or less than 5 percent loss of assimilative capacity due to single discharger or less than10 percent loss for multiple dischargers)...".

TCWN Summary Comment No. 4

There should be language in each of these permits placing a moratorium on any new connections while the receiving waters are still impaired for low dissolved oxygen and nutrients. The river is already beyond its assimilative capacity and increasing the potential for further contribution to these impairments is only going to further degrade the water quality of Harpeth River.

Division's Response For TCWN Summary Comment No. 5

regulate

If the receiving stream's low dissolved oxygen were solely due these three point source dischargers, then the division would likely pursuant additional control options, potentially including moratoriums. However, it is well known that non-point receiving stream inputs are having an adverse impact on the dissolved oxygen levels associated with ***low flow summer conditions. The permit includes a broad array of controls*** on the point sources ***for remedying the receiving stream's low dissolved oxygen during summer conditions.*** The division cannot ~~impose~~ regulate the non-point sources,

TCWN's Franklin STP - Specific Comment No. 1

1. Section 1.1: The reduction in suspended solids to 10 mg/l in the summer also needs to be applied to winter months to address concern about suspended solids impacting pools in the receiving waters.

Division's Response For TCWN's Franklin STP- Specific Comment No. 1

During winter periods the receiving stream flows are much higher, therefore due to hydraulics reduced streambed sediment accumulation should occur since material should be transported downstream.

TCWN's Franklin STP - Specific Comment No. 2

2. Section 3.2 d. ii: The second table contains pre-treatment pollutants required to be analyzed once during the term of the permit. These pollutants should be analyzed and reported at least once a year.

Division's Response For TCWN's Franklin STP- Specific Comment No. 2

These pretreatment program requirements are used unless specific the pollutant(s) present receiving stream water quality concerns. If so, then more frequent monitoring requirements are incorporated into the permit.

TCWN's Franklin STP - Specific Comment No. 3

3. Section 3.4: The chronic biomonitoring for effluent toxicity will yield helpful information, but it is required too infrequently, except when there is a test failure. No requirements were specified for monitoring toxic chemical environmental contaminants in the effluent, which have become of increasing concern for human health.

Division's Response For TCWN's Franklin STP- Specific Comment No. 3

The division uses its reasonable potential approach to determine if permit discharge limits or monitoring requirements are warranted for toxic chemicals. The permit addresses human health concerns in Part 1.1 "The wastewater discharge shall not contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.".

TCWN's Franklin STP - Specific Comment No. 4

4. Section 3.9: Does this language exempt the permit holder from having to obtain a State Operating Permit for the reuse of treated wastewater? It may not be necessary to require reuse water to receive the same treatment as that water being discharged as effluent in the Harpeth River. These will lead to additional chemicals unnecessarily being applied to land. The language must require for the protection of human and animal health, as well as the prevention of pollutant loadings to our waters, but does not need to create additional chemical waste on the land and in the groundwater.

Division's Response For TCWN's Franklin STP- Specific Comment No. 4

A State Operating Permit (SOP) is not required. The division agrees that reuse applications could translate to differing treatment requirements. The E. coli and total residual chlorine limits are more stringent for reuse. In Part 1.1 the permit includes the provision, "In addition, the reuse irrigation system must be operated in a manner preventing the creation of a public health hazard or a public/private nuisance.".

TCWN's Franklin STP - Specific Comment No. 5

5. Attachment 1 (page 35): Chemical monitoring of receiving stream water quality is to be required at three locations (1 upstream, 2 downstream), but only one sample is to be collected mid-depth, mid-channel. Replicates are necessary. Also, the early morning schedule will not detect high pH from algal blooms that may develop downstream in response to nutrient over-enrichment (e.g. phosphorus) from the STP. Monitoring should be required mid-day rather than early morning.

Division's Response For TCWN's Franklin STP- Specific Comment No. 5

The pH values that may develop downstream due to algal blooms would be measured via the diurnal instream monitoring. The permit now includes a provision allowing the division to, without reopening the permit, switch the early morning monitoring to mid-day as suggested by TCWN, if warranted based on the late afternoon results.

TCWN's Franklin STP - Specific Comment No. 6

6. Section R7:5: The permit should more clearly explain any relationship of this facility and that of Jones Creek STP and what considerations from the Jones Creek STP NMP were applied in this permit.

Division's Response For TCWN's Franklin STP- Specific Comment No. 6

The Water Authority of Dickson County - Jones Creek STP TN0066958 permit includes requirements for the development/implementation of a Nutrient Management Plan for optimizing WWTP nutrient removal and includes a receiving stream study for defining impacts from both point and non-points nutrient sources. This information is available in the permit file.

USEPA Comments

The following USEPA comments were extracted from the USEPA's 12/10/2009 email for the Franklin STP proposed permit:

1. A selenium limit (both monthly average and daily maximum) should be applied, since this is a continuous discharge. Per the rationale (p. R-36) the calculated instream water quality selenium equals 4.7 ug/l (chronic) and 29 ug/l (acute). The application shows (six samples) that the average daily discharge 27 ug/l and daily maximum 29 ug/l. Based on these values reasonable potential is evident and permit should have a selenium limit.
2. Per 40 CFR 122.45(d) since this is a continuous discharge total copper and total silver monthly average limitations (even if the frequency is 2x/year), with the chronic values in the permit. Page 2 needs to also include parameter units.
3. The total mercury used (<0.2 ug/l) was not sufficiently stringent for the reasonable potential calculations, and must also be addressed in the permittee's pretreatment program monitoring. The permit needs a reopener provision such that it can be modified if the more sensitive method mercury results in a discharge limit/more frequent monitoring requirement based on reasonable potential water quality calculations.

The USEPA acknowledges the inclusion of appropriate limits for the TMDL (CBOD5, ammonia, and total nitrogen), the ultimate CBOD study, the continued instream monitoring, and the development of the Nutrient Management Plan.

Division's Response For USEPA's Comments

Pursuant to the USEPA comments, the division requested that the permittee provide the supplementary permit application Outfall 001 treated effluent silver, copper, and selenium results. The data is presented in Appendix AD-1A. Water quality reasonable

potential calculations for the Outfall 001 treated effluent silver, copper, and selenium are also provided in Appendix AD-1A.

The draft permit was finalized by addressing the USEPA's comments as follows:

1. Based on the reasonable potential results the new permit includes Outfall 001 total selenium limits (0.005 mg/l monthly average and 0.019 mg/l daily maximum) based on composite sampling and semiannual monitoring frequency.

2. Pursuant to the reasonable potential evaluation, no total copper Outfall 001 discharge limits are needed. However, total silver limits (0.010 mg/l for both monthly average and daily maximum) were used for finalizing the permit based on composite sampling and semiannual monitoring.

3. For mercury monitoring the permittee must use the more sensitive testing method (EPA Method 245.7 or 1631E) for its pretreatment program mercury pass-through testing and permit renewal applications. Also, a reopener provision was included to allow the division to modify the permit to include Outfall 001 treated effluent monitoring limits and/or changes in monitoring frequency, if warranted based on results from a more sensitive mercury method and reasonable potential evaluations.

Addendum to Rationale Attachments:

Attachment AD – 1, Permittee's (Cover Letter) Comments (2009 IWMP Work Plan available in the division file)

Attachment AD – 2, Harpeth River Watershed Association (HRWA) Comments

Attachment AD – 3, Tennessee Clean Water Network (TCWN) Comments

Attachment AD – 1, Permittee's (Cover Letter) Comments

E: Could I get a better plant schematic for Franklin STP
ark Hilty [mark.hilty@franklintn.gov]
nt: Monday, May 13, 2013 7:08 AM
Gary Davis
Juan Davis [juand@franklintn.gov]

anks Gary...we will check into a better schematic. I have discussed the flow monitoring at the plant with CDM Smith so we
ı evaluate a better flow monitoring scenario for us. I'll let you know what we come up with. Thanks,

ırk

---

om: Gary Davis [mailto:Gary.Davis@tn.gov]
nt: Thursday, May 09, 2013 1:03 PM
: Mark Hilty
: Juan Davis
bject: FW: Could I get a better plant schematic for Franklin STP

rk
their today's email, EPA has requested a better plant schematic for the Franklin STP. Please call me if we need to discuss.
ınks
y

y Davis, Permit Writer
ınessee Department of Environment & Conservation
ision of Water Resources
Church Street, 6th Floor L&C Annex
ıhville, TN 37243
ce: 615-532-0649
ail: gary.davis@tn.gov

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m: Kagey, Connie [Kagey.Connie@epa.gov]
ıt: Thursday, May 09, 2013 10:01 AM
Gary Davis
Vojin Janjic; Nuhfer, Mark
ject: Could I get a better plant schematic for Franklin STP

y – if you look at the flow regime through the plant and through the various treatment processes, flow does not "add up"
low may be diverted or the diagram is incorrect. Could you check with the POTW and get one that shows where all the
rs are going. We need this as soon as possible.

nk you,
nie

nie A. Kagey
ı) 562-9300
ıicipal & Industrial NPDES Section
ıtion Control & Implementation Branch
er Protection Division
Environmental Protection Agency
Nunn Atlanta Federal Center
orsyth Street, S.W.
ıta, GA 30303

il: Kagey.Connie@epa.gov

: Could I get a better plant schematic for Franklin STP

/ Davis

Thursday, May 09, 2013 1:03 PM

Hilty, Mark [mark.hilty@franklintn.gov]

Davis, Juan [juand@franklintn.gov]

heir today's email, EPA has requested a better plant schematic for the Franklin STP. Please call me if we need to discuss.

ks

Davis, Permit Writer

essee Department of Environment & Conservation

on of Water Resources

hurch Street, 6th Floor L&C Annex

ille, TN 37243

: 615-532-0649

: gary.davis@tn.gov

: Kagey, Connie [Kagey.Connie@epa.gov]

Thursday, May 09, 2013 10:01 AM

ary Davis

ojin Janjic; Nuhfer, Mark

ct: Could I get a better plant schematic for Franklin STP

- if you look at the flow regime through the plant and through the various treatment processes, flow does not "add up" v may be diverted or the diagram is incorrect. Could you check with the POTW and get one that shows where all the are going. We need this as soon as possible.

you,

e

e A. Kagey

562-9300

ipal & Industrial NPDES Section

on Control & Implementation Branch

Protection Division

vironmental Protection Agency

unn Atlanta Federal Center

syth Street, S.W.

, GA 30303

Kagey.Connie@epa.gov

: TN Inquiry -- Franklin Water and Sewer

ın Janjic

:: Wednesday, April 11, 2012 3:01 PM

Robert Odette; Meg Lockhart; Joey Holland; Saya Qualls; Ann Rochelle; Garland Wiggins; Patrick Parker; Jennifer Watson

Gary Davis; Wade Murphy

ıe best of my knowledge, we have not received any new applications from Franklin... We are drafting their permit reissuance. only thing that comes to mind may be related to Franklin's long-term water and wastewater resource management plan. Gary s is more familiar with it.

ı Janjic

ıger, WPC Permit Section

) 532-0670

ıccept and encourage electronic document submittals.

---

m: Robert Odette

t: Wednesday, April 11, 2012 2:51 PM

Meg Lockhart; Joey Holland; Saya Qualls; Vojin Janjic; Ann Rochelle; Garland Wiggins; Patrick Parker; Jennifer Watson

ject: RE: TN Inquiry -- Franklin Water and Sewer

to my knowledge

ɔert G. O'Dette, M.S., P.E.

stant Manager Municipal Facilities

State Biosolids Coordinator

Floor L&C Annex

Church Street

ıville, TN 37243-1534

:e: (615) 532-0625

:t: (615) 253-5319

(615) 532-0686

INESSEE DEPARTMENT OF

IRONMENT AND CONSERVATION

ı: Meg Lockhart

Wednesday, April 11, 2012 2:45 PM

obert Odette; Joey Holland; Saya Qualls; Vojin Janjic; Ann Rochelle; Garland Wiggins; Patrick Parker; Jennifer Watson

ɛct: RE: TN Inquiry -- Franklin Water and Sewer

:s Bob...have we seen any plans?

: Robert Odette

Wednesday, April 11, 2012 2:44 PM

ɛg Lockhart; Joey Holland; Saya Qualls; Vojin Janjic; Ann Rochelle; Garland Wiggins; Patrick Parker; Jennifer Watson

ct: RE: TN Inquiry -- Franklin Water and Sewer

poke with Garland and Phil and the whole area involving the Harpeth River is extremely limited—no new discharges nor ;ed waste load allocations. As I understand the problem it is primarily a DO issue because of the flat terrain which results in '/poor reaeration of the stream. I was in a meeting several weeks ago with Saya talking to Eagleville—which has the same ׀ן and Saya mentioned the Harpeth River scenario in that meeting. The Stones River in Murfreesboro is ditto—flat stream no more capacity for growth.

ıe this helps.

O'

bert G. O'Dette, M.S., P.E.
istant Manager Municipal Facilities
State Biosolids Coordinator
Floor L&C Annex
Church Street
hville, TN 37243-1534
ce: (615) 532-0625
:ct: (615) 253-5319
: (615) 532-0686

NNESSEE DEPARTMENT OF
VIRONMENT AND CONSERVATION

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n: Meg Lockhart
t: Wednesday, April 11, 2012 2:36 PM
Joey Holland; Saya Qualls; Vojin Janjic; Ann Rochelle; Robert Odette; Garland Wiggins; Patrick Parker; Jennifer Watson
ject: TN Inquiry -- Franklin Water and Sewer
ortance: High

arently, Saya is out of the office until April 17.......I really need help with this information and we need to respond to Kevin y. Anyone have an alternative idea on how to get this answered? Adding a few more folks to the mix.

---

n: Meg Lockhart
t: Wednesday, April 11, 2012 1:09 PM
Joey Holland; Saya Qualls; Vojin Janjic; Ann Rochelle; Robert Odette; Garland Wiggins
Shari Meghreblian; Bob Martineau; David Owenby; Tisha Calabrese
ject: TN Inquiry -- Franklin Water and Sewer

ı Walters with the Tennessean has some questions about Franklin water and sewer. He cited/asked:

ranklin's consultants have recommended that the city add a new sewer plant on the Harpeth River sometime in the next 30 ; that would be upstream from the drinking water plant. Given the condition of the river being on the state impaired list what d the city have to do to get regulatory approval to add more effluent to the river?

as TDEC seen the consultants' plan do they plan to weigh in?

juidance is appreciated. He is on deadline for today!

ks,

;ated Eff Ult BOD & Ult CBOD Results

/ Davis

: Thursday, October 04, 2012 2:39 PM

Billie Haynes [billie.haynes@tecenvirolabs.com]

Davenport, Wayne [wayned@franklintn.gov]

:hments: Ult BOD & Ult CBOD results.doc (106 KB)

ıttached prel results for the Franklin STP treated effluents (2011 & 2012 samples). Please call me when you have a chance.
ıks

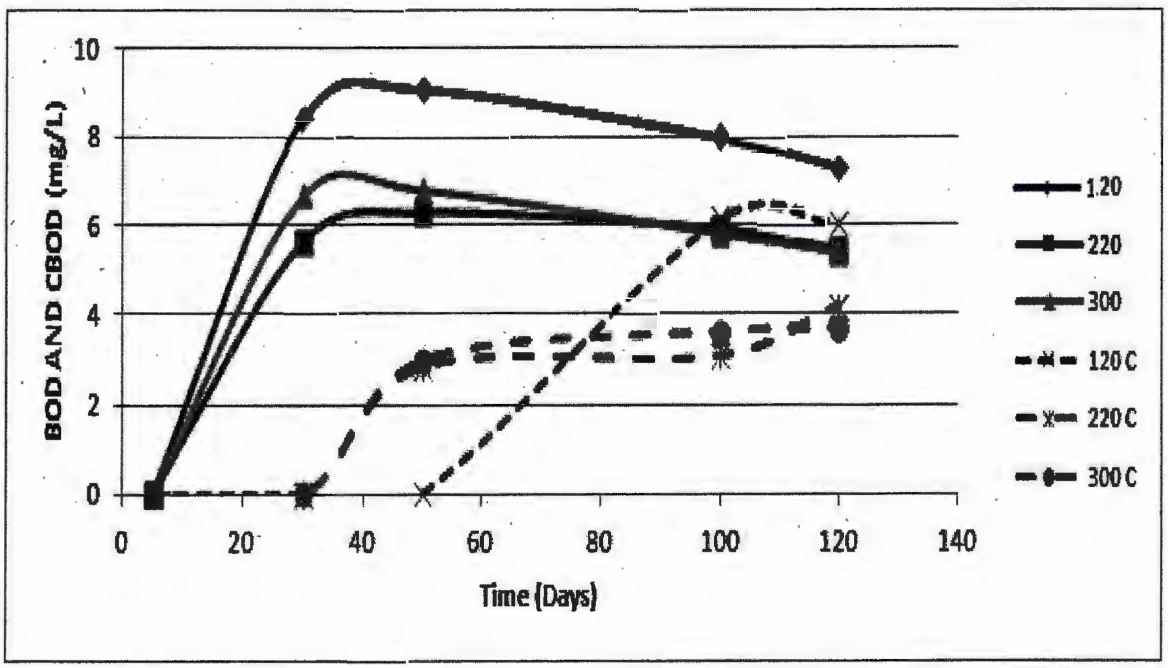
Davis
: - Division of Water Resources
;32-0649

PRELIMINARY RESULTS

Ultimate BOD and Ultimate CBOD Test Results (July 29, 2011Treated Effluent)

Franklin STP TN0028827 UBOD and UCBOD RESULTS

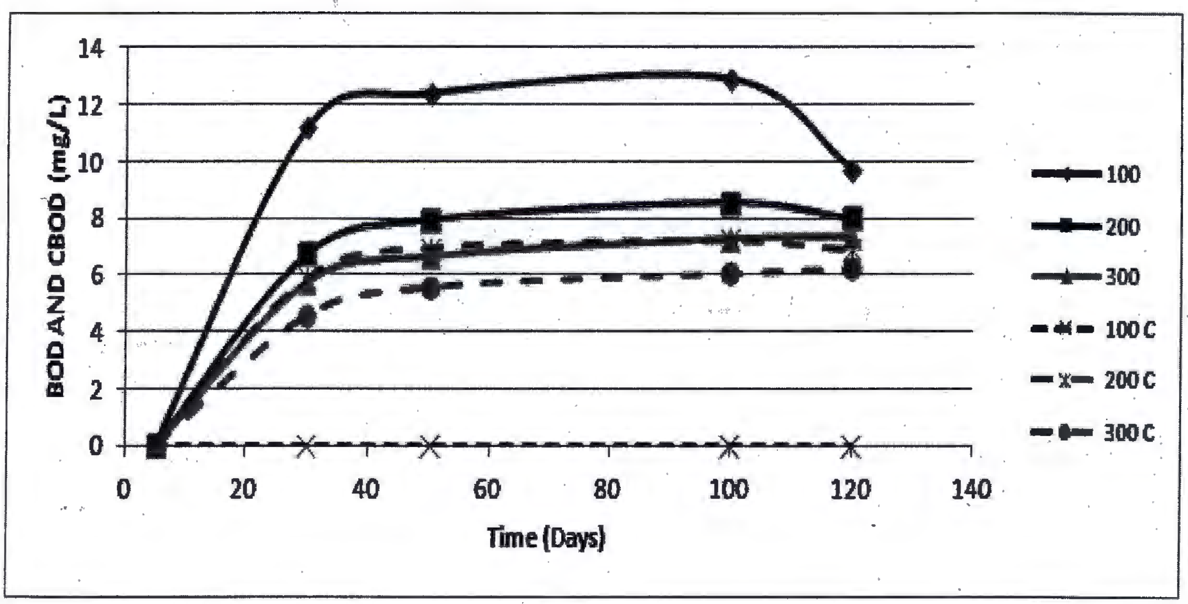
Time (Days)	UBOD (mg/L)			UCBOD (mg/L)		
	Sample/300 ml			Sample/300 ml		
	120 ml	220 ml	300 ml	120 ml	220 ml	300 ml
5	<1	<1	<1	<1	<1	<1
30	8.43	5.62	6.66	<1	<1	<1
50	9.08	6.26	6.78	<1	2.82	2.95
100	7.98	5.89	5.79	6.13	3.07	3.58
120	7.30	5.43	5.38	6.05	4.19	3.68



Ultimate BOD and Ultimate CBOD Test Results (June 5, 2012 Treated Effluent)

Franklin STP TN0028827 UBOD and UCBOD RESULTS (6-5-2012 Treated Effluent)

Time (Days)	UBOD (mg/L)			UCBOD (mg/L)		
	Sample/300 ml			Sample/300 ml		
	100 ml	200 ml	300 ml	100 ml	200 ml	300 ml
5	<1	<1	<1	<1	<1	<1
30	11.2	6.73	5.73	<1	5.91	4.6
50	12.4	7.94	6.64	<1	6.96	5.6
100	12.9	8.55	7.26	<1	7.22	6.08
120	9.72	7.98	7.34	<1	6.89	6.24



: Ultimate BOD & Ultimate CBOD Results for Franklin STP
g.Chen Shiao
: Friday, October 05, 2012 9:28 AM
Gary Davis

,

e the TVA RMS Harpeth River water quality model, which is the one CDM used for the Franklin study. What is the CDM Smith's
e-of-the-art) computer model? I have not talked to them since the model study was over.

nd the numbers in "Results Summary" of the EPA uBOD study questionable. I couldn't come up with the same numbers shown
: table. You might want to check it too.

: Gary Davis
: Friday, October 05, 2012 7:58 AM
ling.Chen Shiao
ect: Ultimate BOD & Ultimate CBOD Results for Franklin STP

lked with EPA & attached their ultimate BOD results for 3 tests run on Oct 1, 2, & 3 2003 samples. Also attached our the
te BOD and ultimate CBOD results for 2011 & 2012 per current permit's requirements. Note that the outside lab's dilution
had significant DO consumption -> with resulting major correction, especially for the 2012 ultimate CBOD 100 ml run.

u have CDM Smith's (state-of-the-art) computer model/talked with them recently?

n STP TN0028827, Berry's Chapel (formally Lynwood) TN0029718, and Cartwright Ck TN0027278 are on Oct 22, 2012 public

call me to discuss.

;

avis
Division of Water Resources
2-0649

Franklin's Treated Eff - Updated uBOD & uCBOD prel results & CODs
ıra Loudermilk
-riday, September 21, 2012 9:44 PM
ohn Thomason [Thomason.John@epamail.epa.gov]
ary Davis

ks, John. I'll check it out and forward this to Gary.
a great weekend.

a G. Loudermilk
Division of Water Resources
ımental Specialist IV
lle Environmental Field Office
S. Gass Blvd
lle, TN 37216

ne 615-687-7000
ine 615-687-7121
615-687-7078

John Thomason [Thomason.John@epamail.epa.gov]
Friday, September 21, 2012 2:33 PM
ırbara Loudermilk
ct: RE: Franklin's Treated Eff - Updated uBOD & uCBOD prel results & CODs

ra-

ıata to John Deatrick, Ecological Assessment Branch Chief, he thought this information may help:

1. **Lab bench sheets with temperatures and any reaerations that were performed during the test may be helpful to better understand the curves (e.g, why DO concentrations on the UBOD test rise over the last few readings).**
2. **Bench sheets for the dilution water test.**
3. **Any nutrient sub-sampling data, if sub-sampling was conducted. If not, was an inhibitor used to get to the CBODU?**

ənt data to John Marlar, who is an expert in looking at this kind of data. He said

From what I can gleen, it seems that the 300 ml sample of effluent is 100% effluent (303 ml BOD bottles?) Just looking at the plots, it does not seem there was any reaeration involved, ie, DO was always at 2 mg/l or higher at 80 days. Since the plot indicates this was a working draft, can it be assumed they continued the time series on to 120 days? I can't come up with an explanation of DO increasing in the BOD test after 60 days or so....

Define how/what constituted Ultimate BOD and Ultimate CBOD. Not clear to me. It is possible that the effluent from the WWTP is completely nitrified, but hey should have the data to show that.

His email is marlar.john@epa.gov if Mr. Davis wants to contact him directly or get back with me.Thanks-John Thomason

From: Barbara Loudermilk
To: Davis, Gary
Date: 6/15/2011 8:49 AM
Subject: Fwd: Re: Hach method 8158

>>> <Terhune.Ray@epamail.epa.gov> 2/1/2011 10:22 AM >>>
Howdy Barbara,

I understand your frustration. But actually you can ding them for not following the "associated" method which is Standard Methods 2540 D. The 1996 HACH method approval letter states that "additional quality control measures may be required to meet specific program monitoring."

I would recommend that you show these folks the errors in their ways as far as insufficient QC and what is required in Standard Methods. Then if they continue to leave it out, ding them then.

If the second method update rule goes into effect soon, there will hopefully be new language in the CFR that requires several QC checks for all wastewater methods, where applicable. For the first time the code will actually require a minimum QC which will cut down on the "cherry picking" of methods that have less QC. But in this case, because HACH always references a Standard Method, the QC which is required in the Standard Method should be followed and documented for compliance testing.

Hope this helps. Let me know if you need anything else.

Have a good one!
Ray Terhune - Chemist
Certified Drinking Water / Wastewater Auditor
Regional DMR-QA Coordinator / ATP Coordinator
USEPA - Region 4
SESD - QA Section
Athens, GA
(706) 355-8557

6-15-2010

Ray

SM 5210-C → not ok? 21st ed.
made NPDES approved. (but 5 yrs old)

6-16-2011 Tel. w/ Ray

6-20-2011

not approved 4 yrs old

5210-B (modified)

can't do 5210-C

needs to use nitrification inhibitor

From: "Barbara Loudermilk" <Barbara.Loudermilk@tn.gov>

To: Ray Terhune/R4/USEPA/US@EPA

Cc: "Bradley.E Smith" <Bradley.E.Smith@tn.gov>, "Bryan Carter" <Bryan.Carter@tn.gov>

Date: 02/01/2011 10:28 AM

Subject: Hach method 8158

e on Harpeth Rive DO

en Shiao

Monday, October 29, 2012 3:27 PM

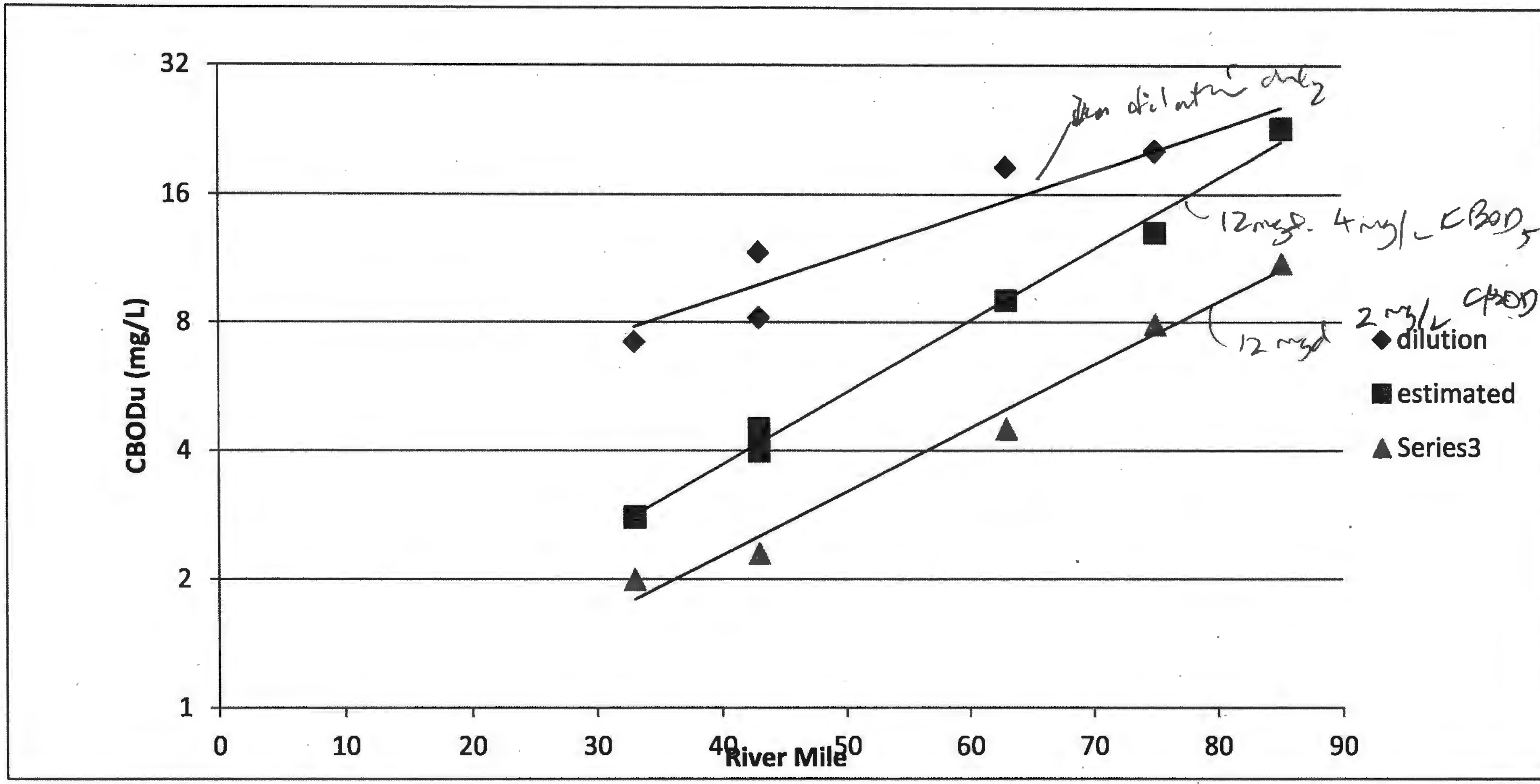
Gary Davis

Sherry Wang

nts: DO&BOD_minmax.docx (183 KB) ; TravelTime.xlsx (30 KB)

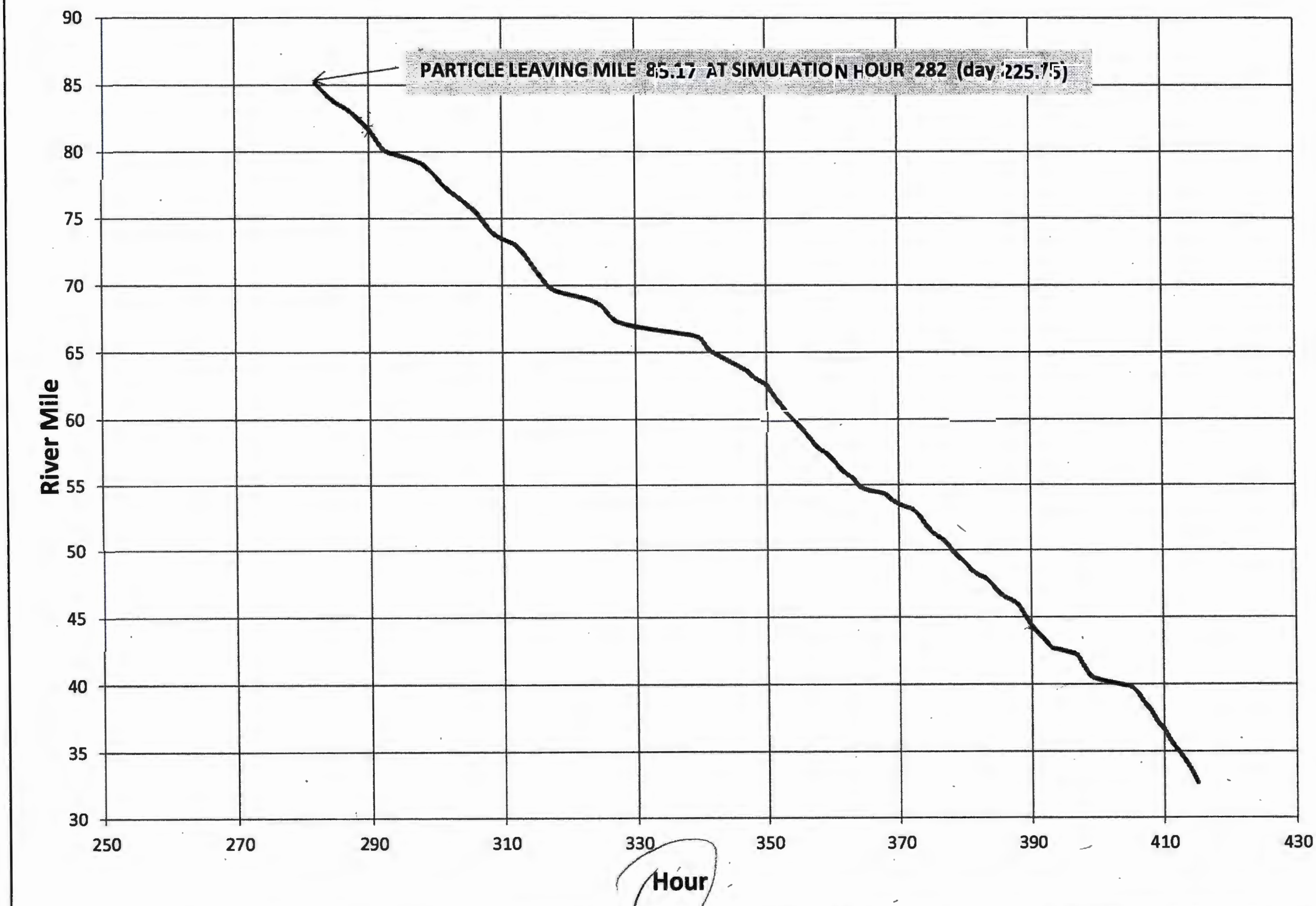
) decay rate is 0.2 for all scenario runs. The slope shown in the CBOD plot needs to be normalized by the starting point ncentration; otherwise we are comparing apple vs. orange. I did an additional run to show the impact of Franklin STP on alone (see the first plot in the attached Word document). In this run, all other sources of CBOD were taken out and all algal activities and SOD were eliminated. The sag point is at about RM 82.5. Water travel time and corresponding flow n in the attached spreadsheet. At this low flow condition, it takes about 12 hours travel time to reach the sag point.

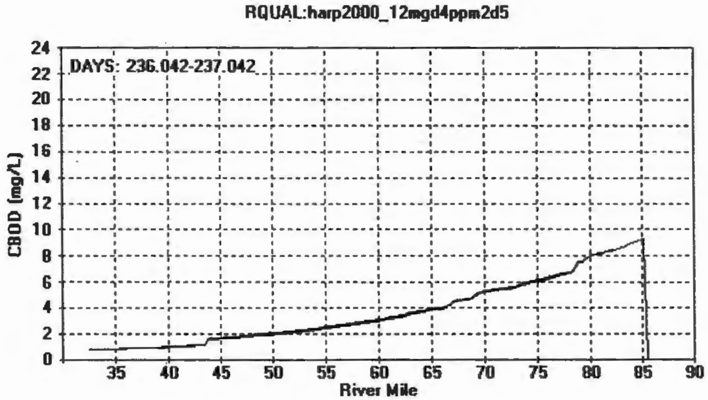
0.225 mph.

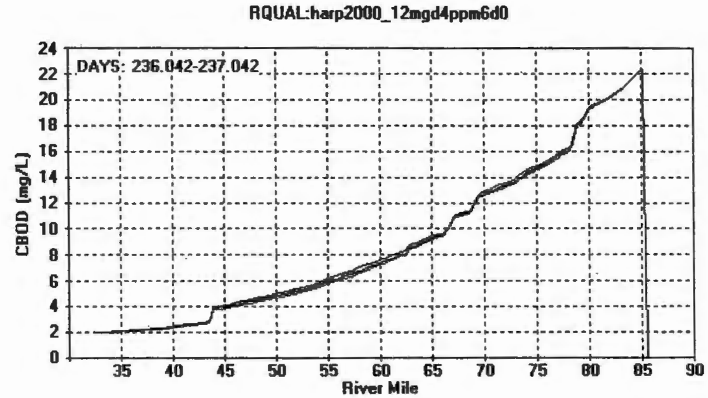


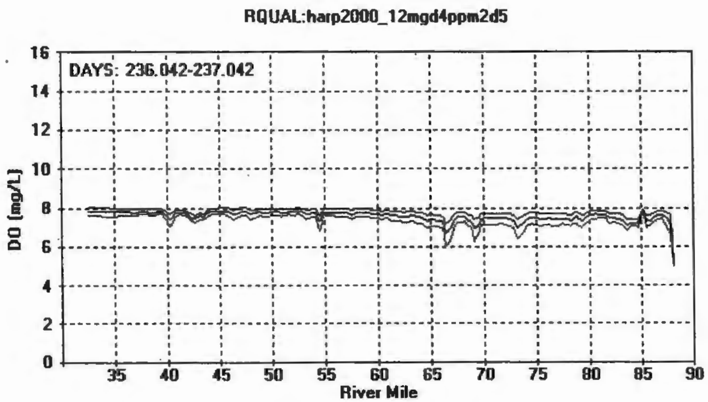
CBODu (mg/L)
32
16
8
4
2
1
0
10
20
30
40
50
60
70
80
90
River Mile
dilution
estimated
Series3
12 mgd. 4 mg/L CBOD5
2 mg/L CBOD5
12 mgd

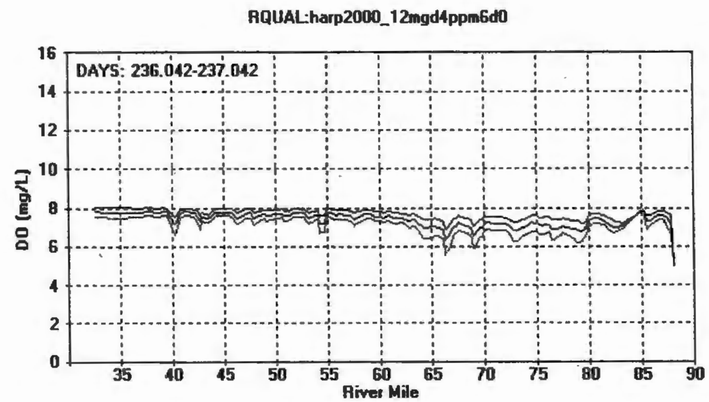
Particle Travel Time

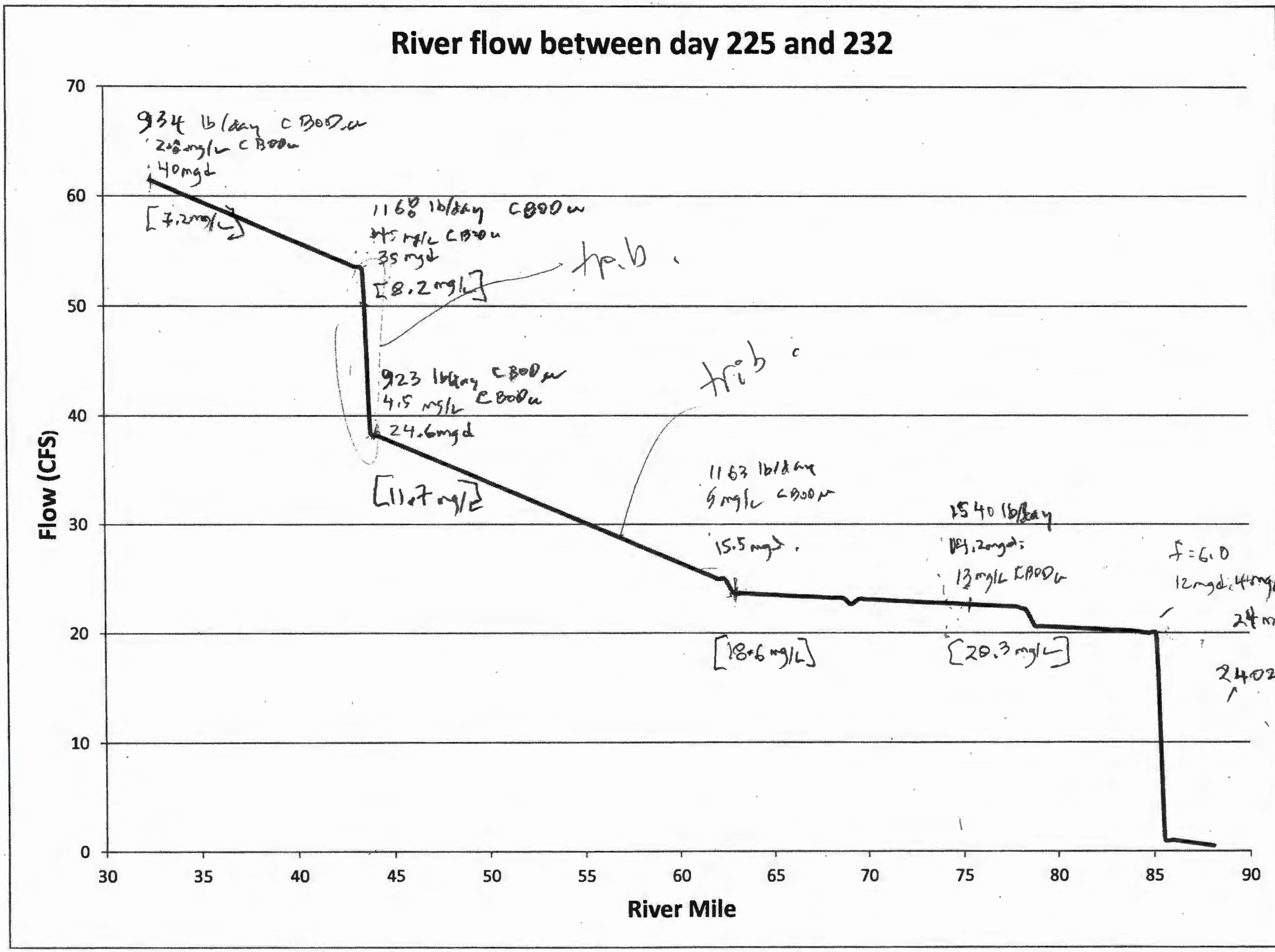



RQUAL:harp2000_12mgd4ppm2d5
DAYS: 236.042-237.042
CBOD (mg/L)
River Mile


RQUAL:harp2000_12mgd4ppm6d0
DAYS: 236.042-237.042
CBOD (mg/L)
River Mile


RQUAL:harp2000_12mgd4ppm2d5
DAYS: 236.042-237.042
DO (mg/L)
River Mile


RQUAL:harp2000_12mgd4ppm6d0
DAYS: 236.042-237.042
DO (mg/L)
River Mile


River flow between day 225 and 232
Flow (CFS)
River Mile
0
10
20
30
40
50
60
70
30
35
40
45
50
55
60
65
70
75
80
85
90
934 lb/day CBODu
40mgd
[7.2mg/L]
35 mgd
[8.2 mg/L]
trib b
923 lb/day CBODu
4.5 mg/L CBODu
24.6mgd
[11.7 mg/L]
trib c
1163 lb/day
15.5 mgd
1540 lb/day
13 mg/L CBODu
[18.6 mg/L]
[20.3 mg/L]
f = 6.0
24 mg/L CBODu
2402 lb/day

ı's comments on our first draft of a Harpeth water quality monitoring plan

Bolze [doriebolze@harpethriver.org]
hursday, September 06, 2012 5:09 PM
ary Davis

',

t with Sherry, David and Regan and Ming today to talk about the monitoring plan for the Harpeth and related ideas. It was meeting, but we need to set up another time for Sherry to show us her information on nutrient monitoring and such from ent EPA meeting.

entioned that he sent you some comments on that draft monitoring plan we sent you back in May. He provided us with his t over the phone today, but it wouldn't hurt to have what he sent you. We have been revising it as well.

have some great material for you early next week and will circulate it around the various permittees, EPA, and other ed parties too.

and hope you are well!

Dorie Bolze

e Bolze
ive Director
h River Watershed Association
Mobile: 615-479-0181
ok Office: 615-790-9767 Ext. 321
: 1127 Franklin, TN. 37065
Address: 215 Jamestown Park, First Floor
ood, TN 37027

Purchase this beautiful specialty license plate
help protect rivers and clean water in TN.

g Together to Protect the State Scenic Harpeth River and Clean Water in Tennessee

Project No. ____
TITLE Ultimate Bod | cBod
Book No. ____

From Page No. ____ timein: 2:30 p.m. 6/6/12 tempin: 20.0°C
timeout: tempout:

sample	Dil	initial do	final do	mg/L
DI		9.01		
seed5		8.95	7.37	0.63 } 0.6
seed10		9.01	6.03	0.60
gga2		9.00	5.94	183
gga4		9.04	4.07	163.13

cBod

c Bod bottle 300ml

	a) Dil=100 ml	b) dil=200	c) dil=300
A) 1206081-001A	~~A~~		
Initial do:	9.27	9.70	10.32
Final do:			
6/11	7.80	7.96	8.20
6/13	7.55	7.43	7.67
6/15	7.42	6.99	7.14
6/18	7.20	6.76	6.94
6/20	7.14	6.61	6.71
6/22	7.03	6.39	6.47
6/25	6.47	5.99	6.15
6/27	6.56	5.81	5.93
6/29	6.49	5.58	5.65
7/2	6.29	5.28	5.37
7/5	6.32	5.19	5.14
7/6	6.26	5.14	5.10
7/9	6.22	5.07	4.90
7/11	6.04	4.89	4.73
7/13	6.09	4.87	4.67
7/14	5.84	4.68	4.47
7/18	5.84	4.70	4.42
7/20	5.75	4.66	4.36
7/23	5.40	4.47	4.20
7/25	5.43	4.48	4.15
7/27	5.36	4.44	4.10
7/30	5.27	4.38	3.93
8/1	5.25	4.37	3.93
8/3			
8/6			
8/8			

Witnessed & Understood by me Date Date

Ultimate Bod | cBod

sample	Bod A dil=100	B dil=200	C dil=300	mg/L
5) 1206081-001B				
initial do:	9.23	9.50	9.98	
final do:				
6/11	8.03	7.84	7.66	
6/13	7.70	7.54	7.21	
6/15	7.33	6.94	6.56	
6/18	7.28	6.45	6.02	
6/20	7.07	5.97 ~~6.64~~	5.64	
6/22	6.85	5.58	5.20	
6/25	6.30	5.13	4.74	
6/27	5.99	4.93	4.44	
6/29	5.56	4.77	4.15	
7/2	5.03	4.57	3.84	
7/5	~~4.57~~ 4.91	4.45	3.56	
7/6	4.88	4.39	3.63	
7/9	4.82	4.27	3.41	
7/11	4.64	4.09	3.31	
7/13	4.67	4.06	3.24	
7/16	4.54	3.91	3.12	
7/18	4.56	3.87	3.05	
7/20	4.55	3.82	2.99	
7/23	4.45	3.68	2.80	
7/25	4.44	3.64	2.72	
7/27	4.47	3.59	2.63	
7/30	4.36	3.43	2.46	
8/1	4.33	3.36	2.36	
8/3				
8/6				
8/8				

Gary Davis - Re: Fwd: FW: results

From: Ming.Chen Shiao
To: Davis, Gary
Date: 11/23/2011 8:35 AM
Subject: Re: Fwd: FW: results
CC: Evans, Bruce; Wang, Sherry

I'm surprised to see that both BOD5 and CBOD5 are less than the detect limit (1 mg/l). Further more, CBOD30 and CBOD50 ml dilution) are less than 1 mg/l. Either the effluent was chlorinated or it included some kinds of industrial wastes that suppressed microbiological growth or activity. The EPA study in 2000 showed a CBODu around 5 mg/l.

Ming

>>> Gary Davis 11/22/2011 4:05 PM >>>
Ming
Per our tel conversation, please look through Franklin's UBOD & UCBOD attached results (as pdf) & let me know what you thi
Thanks
Gary
>>> Wayne Davenport <wayned@franklintn.gov> 11/22/2011 2:26 PM >>>

Gary,

We received these UBOD and UCBOD results today from Billie Haynes at TEC Labs. Please look over this data and, at your convenience, I would like to discuss and get your interpretation of these results.

.ooking forward to hearing from you.

'hanks,

/ayne

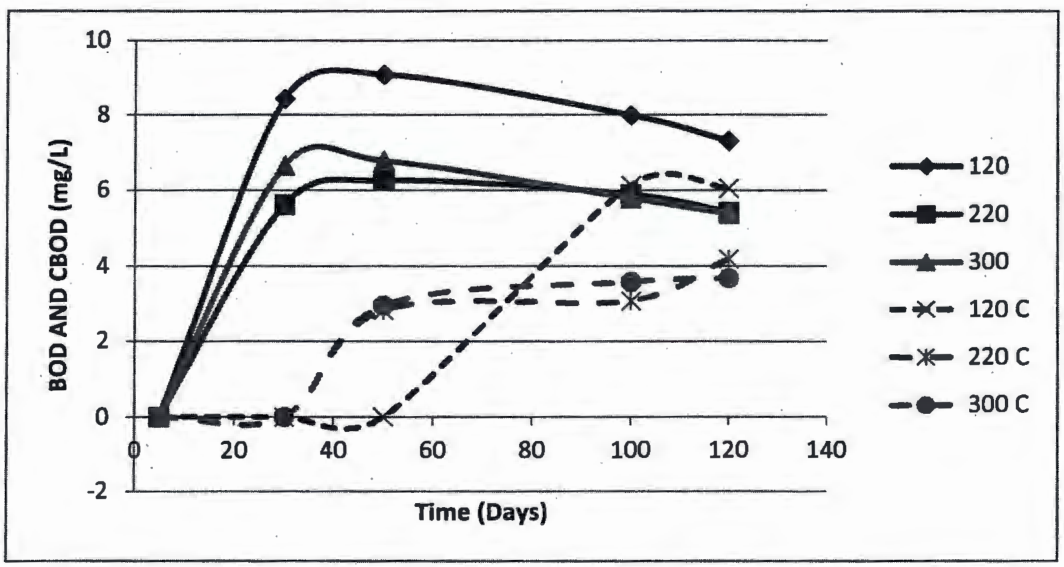
---

om: Billie Haynes [mailto:billie.haynes@tecenvirolabs.com]
nt: Tuesday, November 22, 2011 12:40 PM
: Wayne Davenport
bject: results

dcopy will follow.

Franklin STP TN0028827 UBOD and UCBOD RESULTS

Time (Days)	UBOD (mg/L) Sample/300 ml			UCBOD (mg/L) Sample/300 ml		
	120 ml	220 ml	300 ml	120 ml	220 ml	300 ml
5	<1	<1	<1	<1	<1	<1
30	8.43	5.62	6.66	<1	<1	<1
50	9.08	6.26	6.78	<1	2.82	2.95
100	7.98	5.89	5.79	6.13	3.07	3.58
120	7.30	5.43	5.38	6.05	4.19	3.68



ry Davis - FW: results

ɪm: Wayne Davenport <wayned@franklintn.gov>
"Gary.Davis@tn.gov" <Gary.Davis@tn.gov>
:e: 11/22/2011 2:27 PM
ɪject: FW: results
: Mark Hilty <mark.hilty@franklintn.gov>, Juan Davis <juand@franklintn.gov>
achments: doc20111122122342.pdf

',
received these UBOD and UCBOD results today from Billie Haynes at TEC Labs. Please look over this data and, at your
'enience, I would like to discuss and get your interpretation of these results.
:ing forward to hearing from you.
ıks,
ne

n: Billie Haynes [mailto:billie.haynes@tecenvirolabs.com]
:: Tuesday, November 22, 2011 12:40 PM
Nayne Davenport
ject: results

copy will follow.

TEC Environmental Laboratories, Inc.

2269 Dr. F. E. Wright Drive
Jackson, Tennessee 38305

Phone # (731) 423-5330
Fax # (731) 423-5326

Wayne Davenport
City of Franklin
135 Claude Yates Drive
Franklin, TN 37064

TEL: 615-791-3240
FAX 615-791-3208

RE: Ultimate BOD/CBOD

Order No.: 11072112

Dear Wayne Davenport:

TEC Environmental Laboratories, Inc. received 1 sample on 7/21/2011 for the analyses presented in the following report.

As always we appreciate your business and are pleased to be of service to you.

If you should have any questions, please feel free to call.

Sincerely,

Billie J. Haynes

Billie Haynes

TEC Environmental Laboratories, Inc.

Date: *22-Nov-11*

CLIENT:	City of Franklin	**Client Sample ID:**	Plant Effluent
Lab Order:	11072112	**Collection Date:**	7/20/2011
Project:	Ultimate BOD/CBOD		
Lab ID:	11072112-01	**Matrix:**	WASTE WATER

Analyses	Result	Qual	MDL	RLimit	Units	DF	Date Analyzed
AMMONIA AS N			**M4500-NH3 D**				Analyst: **KNH**
Ammonia as N	ND		0.20	0.200	mg/L	1	7/26/2011 1:00:00 PM
NITRITE AS N			**E353.2**				Analyst: **HE**
Nitrogen, Nitrite	ND		0.20	0.200	mg/L	1	7/21/2011 3:45:00 PM
NITRATE AS N			**E353.2**				Analyst: **HE**
Nitrogen, Nitrate (As N)	0.445		0.20	0.200	mg/L	1	7/21/2011 3:45:00 PM

Reviewed By: Billie L. Haynes

Billie Haynes

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quanititation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

: Franklin's/CDM-Smith's Draft Final (7/2012)
g.Chen Shiao
:: Tuesday, October 16, 2012 2:37 PM
Gary Davis

',

e couple comments on the Draft Final.

Vhat are the alternatives 1, 2, 3, and 4 presented in Section 4.2.2.2 ? There are six alternatives on page 4-15, but it doesn't tell which is what.
'he EPA TMDL BOD loadings (Sec. 4.2.2.5) are highly questionable. Do we have to compare with those numbers?

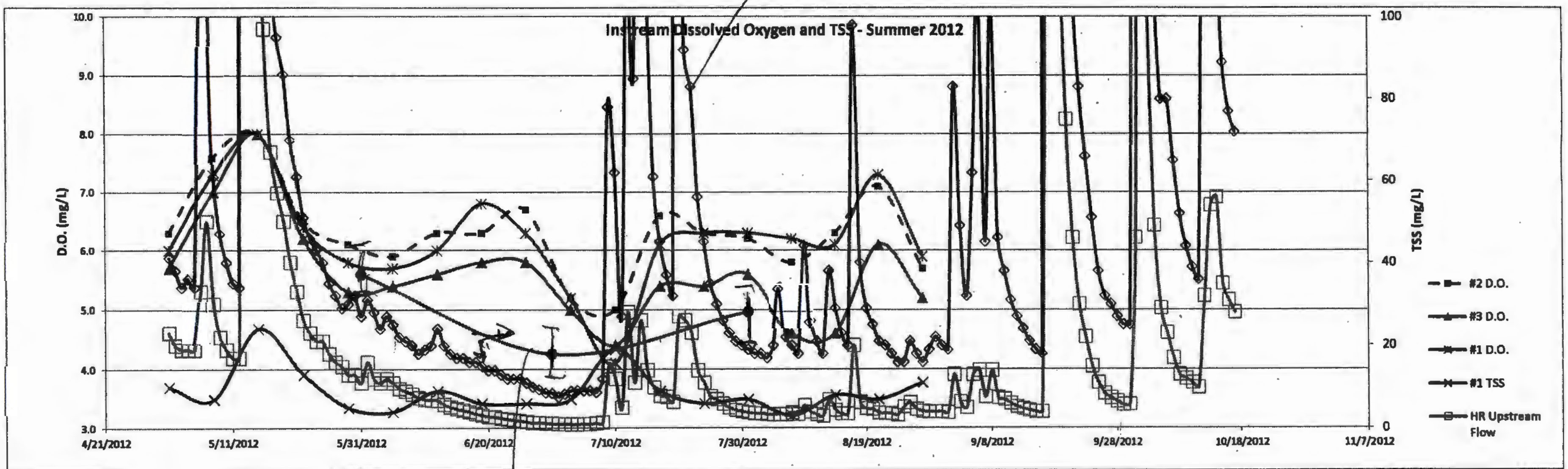
---

n: Gary Davis
t: Tuesday, October 16, 2012 11:02 AM
Ming.Chen Shiao
ject: Franklin's/CDM-Smith's Draft Final (7/2012)

ur tel conversation this morning, I've attached the draft final doc - please look at the modeling/Harpeth River WQ parts & let now what you think.
ks

Davis
: - Division of Water Resources
532-0649

Downstream Flow



001 D.O. lb/day /10

: Franklin's HR Local Monitoring Results
g.Chen Shiao
: Tuesday, October 09, 2012 1:53 PM
Gary Davis

' all seem reasonable, except DO at site 2 on 5/31/2011 and 6/7/2011. They are not supported by the corresponding CBOD ction between sites 1 and 2. Site 3 should be near the sag point.

1: Gary Davis
: Tuesday, October 09, 2012 1:19 PM
/ling.Chen Shiao
/like Thornton
ect: Franklin's HR Local Monitoring Results

ttached Franklin's Harpeth River monitoring results (per current permit) - please see D.O. chrono plots 2011 summer and 2012 ıer.
scuss.

/: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

y Davis

t: Friday, September 07, 2012 1:22 PM

Dorie Bolze [doriebolze@harpethriver.org]

chments: In-stream wq monitoring plan.doc (24 KB)

e

your 9-6-2012 email request, this email should include Ming's May 25, 2012 emailed comments re: HRWA's proposed Harpeth r Monitoring Plan.

iks

Davis

: - Div. of Water Resources

532-0649

---

i: Ming.Chen Shiao
: Tuesday, July 31, 2012 3:27 PM
iary Davis
ect: FW: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

d the comments that I sent to you back in May (it is not erased yet). Comments 6 and 7 are directly related to the proposed monitoring plan. Let me know if you have any questions.

Ming.Chen Shiao
Friday, May 25, 2012 8:45 AM
ary Davis
erry Wang
ct: RE: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

iments are listed below:

Ↄ in Harpeth River is the product of meteorology, hydrology, and point and nonpoint source waste loads. Looking at DO alone ɔut knowing its underlining dynamics makes it very difficult for all interested parties and stakeholders to come to a consensus ıe impact of individual waste load and how to manage water quality in Harpeth River. Mathematical modeling is the only tool can provide the answer.

eld data collected in past decade show that DO in one individual year can be quite different from another year with different :orology and hydrology. In addition, DO measurements at the same station can vary greatly at different time of the day due to ıresence of algae and periphyton. Again, mathematical modeling is the only tool to integrate and reproduce the DO dynamics are not transparent in grab samples differed in space and time.

əmoving the low head dam upstream of Franklin STP may alter significantly the hydraulics and create a new DO pattern in that ch of river. A good set of field data will be needed to recalibrate the model to the new paradigm.

addition to regulatory usage, water quality monitoring should also aim at providing data for model calibration and ication.

ıe water quality monitoring plan outlined by HRWA is expensive and does not meet the need of model calibration. Since low always occur under low flow conditions, I recommend that either Level II or III (see the attached monitoring guideline) be əmented at the 7 proposed continuous sampling sites (water drop symbol in HRWA monitoring map). Grab samples at the th of major tributaries ("S" symbol in HRWA monitoring map) should be collected daily during the sampling period (July or ıst).

water quality information is needed outside of the low flow period, field works should be limited to grab samples and olab parameters.

g

---

n: Gary Davis
t: Tuesday, May 22, 2012 3:15 PM
Jimmy R. Smith; Ming.Chen Shiao; Mike Thornton
ject: FW: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

ıy, Ming & Mike

ne know what you think re: Harpeth river monitoring plan

ıks

---

n: Dorie Bolze [doriebolze@harpethriver.org]
t: Tuesday, May 22, 2012 10:42 AM
Gary Davis
Sherry Wang; Vojin Janjic; Saya Qualls; Shari Meghreblian; 'Michael Cain'; alexandraewing@harpethriver.org
ject: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

:ND:

version of the map of complied Dissolved Oxygen sites is slightly updated to make some things more legible when printed at :17".

ɔ Gary,

ıs great to see you at AWRA in mid April and talk about the dissolved oxygen data that has been gathered by various entities the past 10 years or more on the Harpeth and many other things. I appreciated your call in early May letting us know that vere interested in our input on monitoring on the Harpeth as you and the department work on the latest draft of the three :S sewer permits for the city of Franklin, Berry's Chapel Utility, and Cartwright Creek Utility. I understand that you hope to new drafts before the end of the month.

ɜ attached a cover letter that offers several points from our prior comments on these permits that we hope you and the rtment are considering for the renewals. Specifically one emphasis is on establishing a river basin water quality monitoring based on the over ten years of dissolved oxygen data that has been collected by EPA, TDEC, and HRWA and the city of :lin.

this cover letter we have prepared a monitoring plan for the river and two maps that show the locations of these monitoring ɜnd those locations of prior studies. The maps also show the 303d listed streams, all of the NPDES sewer plant discharges, · municipal outlines, and major tributaries.

we have included an excel spreadsheet of all of the D.O. data on the Harpeth that was gathered using continuous meters or ı grab method that tracked the diurnal cycle over a 24-hour period. Other grab sampling data exists as well, but are not in ɔmpilation. TDEC has much of this data.

second email I include the presentation we gave at AWRA-TN this past April. It has all of the dissolved oxygen charts, maps, low analysis, some of the charts from Franklin's Integrated Water Resources Plan specific to TMDL loads, and a few slides ng on the key issues with the two river modeling efforts to date.

ɔte Bill Melville from EPA region IV who worked in the EPA's Harpeth river TMDL from 2002-2004, field data trumps models. he field data indicating continuing issues on the Harpeth with much of the entire length of the river not meeting state ırds during the low-flow summer, it is time to put a detailed monitoring plan in place that provides real-time data to help y sources, and set a new TMDL and allocations that will ensure that the Harpeth river during the summer will meet state quality standards.

would like to assist in convening a technical advisory group together that would review the river monitoring plan we have ed. We would also very much like to help coordinate the implementation of the monitoring effort among all of the ısible and interested entities. Please don't hesitate to call me about what we have provided and how we can be of nce.

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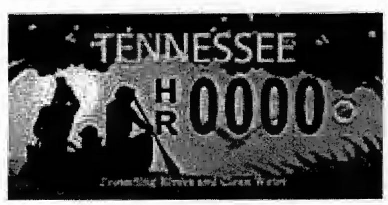

Dorie Bolze

ne Bolze
ıtive Director
ɜth River Watershed Association
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ɔx 1127 Franklin, TN. 37065
t Address: 215 Jamestown Park, First Floor
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ng Together to Protect the State Scenic Harpeth River and Clean Water in Tennessee

/: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

g.Chen Shiao

: Tuesday, July 31, 2012 3:27 PM

Gary Davis

chments: In-stream wq monitoring plan.doc (24 KB)

',

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1: Ming.Chen Shiao
: Friday, May 25, 2012 8:45 AM
Gary Davis
Sherry Wang
ect: RE: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

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: Gary Davis
Tuesday, May 22, 2012 3:15 PM
nmy R. Smith; Ming.Chen Shiao; Mike Thornton
ect: FW: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

, Ming & Mike

e know what you think re: Harpeth river monitoring plan

s

: Dorie Bolze [doriebolze@harpethriver.org]
Tuesday, May 22, 2012 10:42 AM
ary Davis
herry Wang; Vojin Janjic; Saya Qualls; Shari Meghreblian; 'Michael Cain'; alexandraewing@harpethriver.org
ect: 1 of 2: Harpeth river monitoring plan re upcoming sewer plant permit renewals

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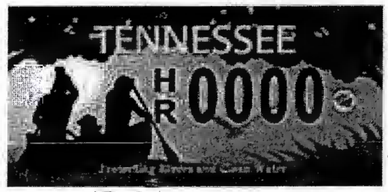

Dorie Bolze

ene Bolze
:utive Director
)eth River Watershed Association
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Box 1127 Franklin, TN. 37065
et Address: 215 Jamestown Park, First Floor
ıtwood, TN 37027

Purchase this beautiful specialty license plate
help protect rivers and clean water in TN.

king Together to Protect the State Scenic Harpeth River and Clean Water in Tennessee

Franklin STP TN0028827 draft 4-22-2013

ɔie Arnwine

Thursday, April 25, 2013 8:42 AM

Gary Davis; Jimmy R. Smith

ıments: Permit template11.docx (17 KB)

look at the permit in more detail later, but a quick look at the biological monitoring component (page 38 B4 see ı) still reference the EPA document and does not refer to the TDEC QSSOP. This needs to be replaced with DEC template (see attached).

ıiosurvey must integrate the habitat and macroinvertebrate assessments. The y must be conducted in accordance with semi-quantitative single habitat ɔols issued by the Division as adapted from EPA's Rapid Bioassessment cols For Use in Streams and Rivers EPA/841-B-99-002. Habitat will be rically assessed using the High Gradient Habitat Assessment Field Data : in Appendix A of the EPA manual. Two 1-meter square riffle kicks using a ıicron net will be collected as outlined in section 7.1. of the EPA manual. les will be composited and preserved for lab analysis. A 200-organism subsample ı processed in accordance with section 7.3. All *taxa* are to be ied to the genus level. Biometrics and data interpretation must be completed ordance with most current approved division methodology.

ı Arnwine
ımental Specialist 5
ıg and Standards Section, DWR, TDEC
or L&C Annex, 401 Church Street
lle, TN 37243
2-0703

Gary Davis

Thursday, April 25, 2013 8:21 AM

bbie Arnwine; Jimmy R. Smith

:t: Franklin STP TN0028827 draft 4-22-2013

& Jimmy

ached Franklin STP's draft permit - drafts for Berry's Chapel TN0029718 & Cartwright Ck TN0027278 are in WaterLog. eview (especially Franklin's) & give me a call to discuss. e some time, since I expect that we will have a public hearing (like the last renewals) for these drafts.

vis, Permit Writer
ee Department of Environment & Conservation
of Water Resources
rch Street, 6th Floor L&C Annex
ı, TN 37243
515-532-0649
ıary.davis@tn.gov

Davis - RE: Franklin STP Draft Permit TN0028827 Comments Extension Ltr

ı: Mark Hilty <mark.hilty@franklintn.gov>
Gary Davis <Gary.Davis@tn.gov>
10/1/2009 3:57 PM
ct: RE: Franklin STP Draft Permit TN0028827 Comments Extension Ltr
Eric Stuckey <eric.stuckey@franklintn.gov>, David Parker <Davidp@franklintn.gov>

---

vis,

you for your consideration in this matter. When we get through our initial detailed review, we will be sure to contact you cussion. Thanks again,

. Hilty, PE
Management Department Director
615-794-4554

Gary Davis [mailto:Gary.Davis@tn.gov]
hursday, October 01, 2009 3:51 PM
k Hilty
t: Franklin STP Draft Permit TN0028827 Comments Extension Ltr

n in the attached letter (as a pdf), we have approved your requested extension for submitting your draft permit written ts. We look forward to discussing the draft permit provisions with you and your consultants. Please let me know if such ns are needed.

2013 Harpeth River water quality

Davis
Tuesday, May 14, 2013 12:55 PM
'ade Murphy

Greg Denton 532-0699

discuss
s

Davis, Permit Writer
ssee Department of Environment & Conservation
ion of Water Resources
hurch Street, 6th Floor L&C Annex
ille, TN 37243
e: 615-532-0649
: gary.davis@tn.gov

Barbara Wiener [barb.mark@comcast.net]
Tuesday, May 14, 2013 12:24 PM
ary Davis
ct: 2013 Harpeth River water quality

e followed the conditions of the Harpeth River since 2000. Seems like sewage and manure on-point run off have hurt dissolved O2 and other measures for a long time. Is there a t for 2013 you can share?

, kindly reply to swpv@comcast.net

d to kayak on the Harpeth. Have not done so in awhile since I moved to SW PA where our s are even more polluted.

.s much,

Wiener
rly Kingston Springs TN
IcDonald PA 15057

TN0028827

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
401 CHURCH STREET
L & C ANNEX 6TH FLOOR
NASHVILLE TN 37243
October 1, 2009

Mr. Mark Hilty
Director
Franklin STP
109 3rd Avenue South
Franklin, TN 37064

Subject: **NPDES Draft Permit No. TN0028827**
Franklin STP
Franklin, Williamson County, Tennessee

Dear Mr. Hilty:

This letter provides you the extension until December 1, 2009 for submitting your written comments regarding your draft permit, pursuant to the rationale and request included in your September 23, 2009 letter to Mr. Gary Davis. We look forward renewing your permit as soon as possible. If you have questions, please contact Mr. Gary Davis at (615) 532-0649 or by E-mail at *Gary.Davis@tn.gov*.

Sincerely:

Vojin Janjić
Manager, Permit Section

CC: DWPC, Permit Section & Nashville Environmental Field Office

Gary Davis

From:	Gary Davis
Sent:	Friday, September 06, 2013 9:53 AM
To:	Meredith S. Benton
Subject:	RE: Draft - Notice of Hearing (NPDES permits for Franklin STP, Berry's Chapel & Cartwright Ck)

Meredith
Appreciate your feedback - we agree it is best to include a specific date (per the 10 days from hearing). I will contact the Franklin Recreation Complex contact to move forward. During a recent conversation with Dorie I discussed potential scheduling.
Thanks
Gary

From: Meredith S. Benton
Sent: Wednesday, September 04, 2013 2:45 PM
To: Gary Davis
Cc: Vojin Janjic; Wade Murphy
Subject: RE: Draft - Notice of Hearing (NPDES permits for Franklin STP, Berry's Chapel & Cartwright Ck)

Gary,

Thanks for sharing this. It looks great. My only recommendation would be to add a specific date when we say that written comments can be received for 10 working days following the hearing. I realize we don't know when that is until we schedule the hearing, but it might be helpful to include when we do know the date.

Once we check the room availability, might I recommend that we call Dori and ask if she has a preference for what dates are available? At that point we can also request an opportunity to meet with her in advance, if you think it would be helpful to the process? I am happy to discuss this so please let me know if you would like to do so.

Thanks so much,
Meredith

Meredith Sullivan Benton
Regional Director, Office of External Affairs
Nashville Field Office
711 R.S. Gass Boulevard
Nashville, Tennessee 37243
): 615-687-7074
: 615-687-7078
: Meredith.S.Benton@tn.gov

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rom: Gary Davis
ent: Tuesday, September 03, 2013 12:27 PM
o: Meredith S. Benton
c: Vojin Janjic; Wade Murphy
ubject: Draft - Notice of Hearing (NPDES permits for Franklin STP, Berry's Chapel & Cartwright Ck)

leredith
lease see the attached draft – Notice of Hearing. Let me know if any Notice of Hearing changes are needed and I will nail a request to them. I plan to check on the facility usage and room availability per a tentative hearing date on Oct

15, 17 or 29, or Nov 7 , 14. If our usage is acceptable to them I expect that they will require additional information from us.
Thanks
Gary

Gary M. Davis, P.E., Permit Writer
Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, TN 37243
Office: 615-532-0649
Email: gary.davis@tn.gov

% saturation calculator

my R. Smith

: Thursday, December 20, 2012 10:58 AM

Gary Davis

:hments: DO sat calc.xls (28 KB)

,

ıttached for the DO sat calculator I have been using. You enter the BP, Temp, and measured dissolved oxygen entration, and it will calculate the % saturation. The field that has the long equation that does the conversion is in cell E4 ı want to check it out. I do not recall where I found this originally.

e let me know if you have any questions about this, and I hope it is of some use.

‹s - Jimmy

QUALITY
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int pollution
species
eters: lakes
lved oxygen
ical conductivity
erature
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eters: streams
ical conductivity
erature
ity

Home : **Understanding** : **Water Quality** : Parameters : Dissolved Oxygen

Dissolved Oxygen

Why Is It Important?

Like terrestrial animals, fish and other aquatic organisms need **oxygen** to live. As water moves past their gills (or other breathing apparatus), microscopic bubbles of oxygen gas in the water, called **dissolved oxygen** (DO), are transferred from the water to their blood. Like any other gas **diffusion** process, the transfer is efficient only above certain concentrations. In other words, oxygen can be present in the water, but at too low a concentration to sustain aquatic life. Oxygen also is needed by virtually all **algae** and all **macrophytes**, and for many chemical reactions that are important to lake functioning.

Reasons for Natural Variation

Oxygen is produced during **photosynthesis** and consumed during respiration and **decomposition**.

Because it requires light, photosynthesis occurs only during daylight hours. Respiration and decomposition, on the other hand, occur 24 hours a day. This difference alone can account for large daily variations in DO concentrations. During the night, when photosynthesis cannot counterbalance the loss of oxygen through respiration and decomposition, DO concentration may steadily decline. It is lowest just before dawn, when photosynthesis resumes.

Other sources of oxygen include the air and inflowing streams. Oxygen concentrations are much higher in air, which is about 21% oxygen, than in water, which is a tiny fraction of 1 percent oxygen. Where the air and water meet, this tremendous difference in concentration causes oxygen molecules in the air to dissolve into the water. More oxygen dissolves into water when wind stirs the water; as the waves create more surface area, more diffusion can occur. A similar process happens when you add sugar to a cup of coffee - the sugar dissolves. It dissolves more quickly, however, when you stir the coffee.

Another physical process that affects DO concentrations is the relationship between water temperature and gas **saturation**. Cold water can hold more of any gas, in this case oxygen, than warmer water. Warmer water becomes "saturated" more easily with oxygen. As water becomes warmer it can hold less and less DO. So, during the summer months in the warmer top portion of a lake, the total amount of oxygen present may be limited by temperature. If the water becomes too warm, even if 100% saturated, O_2 levels may be suboptimal for many species of trout.

	Instream Dissolved Oxygen
I. SALMONID WATERS	
A. Embryo and larval stages	
No production impairment	11
Slight production impairment	9
Moderate production impairment	8
Severe production impairment	7
Limit to avoid acute mortality	6
B. Other life stages	
No production impairment	8
Slight production impairment	6
Moderate production impairment	5
Severe production impairment	4
Limit to avoid acute mortality	3
II. NON-SALMONID WATERS	
A. Early life stages	
No production impairment	6.5
Slight production impairment	5.5
Moderate production impairment	5
Severe production impairment	4.5
Limit to avoid acute mortality	4
B. Other life stages	
No production impairment	6
Slight production impairment	5
Moderate production impairment	4
Severe production impairment	3.5
Limit to avoid acute mortality	3
III. INVERTEBRATES	
No production impairment	8

Moderate production impairmenT	5
Limit to avoid acute mortality	4

PUTTING THE SQUEEZE ON FISH

Mid-summer, when strong thermal stratification develops in a lake, may be a very hard time for fish. Water near the surface of the lake - the epilimnion - is too warm for them, while the water near the bottom - the hypolimnion - has too little oxygen. Anoxia forces the fish to spend more time higher in the water column where the warmer water is suboptimal for them. This may also expose them to higher predation, particularly when they are younger and smaller.

Eutrophication exacerbates this condition by adding organic matter to the system which accelerates the rate of oxygen depletion in the hypolimnion. Urban, and other forms of runoff, can also add to this problem very suddenly and dramatically by causing fish kills after excess soils and road hydrocarbons are washed in from intense rainstorms. Conditions may become especially serious during a stretch of hot, calm weather, resulting in the loss of many fish. You may have heard about summertime fish kills in local lakes that likely results from this problem.

In eutrophic and hypereutrophic lakes, summertime fish kills can happen most easily during periods with high temperatures, little wind and high cloud cover. The clouds reduce daytime photosynthesis with its oxygen production and so the DO in the mixed layer. Or even throughout the water column of a shallow unstratified lake, can become critical for fish and other aquatic organisms.

The same basic phenomenon can occur in winter (winterkill) when ice cover removes re-aeration from the atmosphere and snowcover can light-limit algal and macrophyte photosynthesis under the ice. Many lakes in the upper midwest are mechanically re-aerated or injected with air, oxygen or even liquid oxygen to keep ice off of some of the lake and to add oxygen directly to prevent winterkills.

Dissolved oxygen concentrations may change dramatically with lake depth. Oxygen production occurs in the top portion of a lake, where sunlight drives the engines of photosynthesis. Oxygen consumption is greatest near the bottom of a lake, where sunken **organic** matter accumulates and decomposes. In deeper, **stratified**, lakes, this difference may be dramatic - plenty of oxygen near the top but practically none near the bottom. If the lake is shallow and easily mixed by wind, the DO concentration may be fairly consistent throughout the water column as long as it is windy. When calm, a pronounced decline with depth may be observed.

Seasonal changes also affect dissolved oxygen concentrations. Warmer temperatures during summer speed up the rates of photosynthesis and decomposition. When all the plants die at the end of the growing season, their decomposition results in heavy oxygen consumption. Other seasonal events, such as changes in lake water levels, volume of **inflows** and **outflows**, and presence of ice cover, also cause natural variation in DO concentrations.

Expected Impact of Pollution

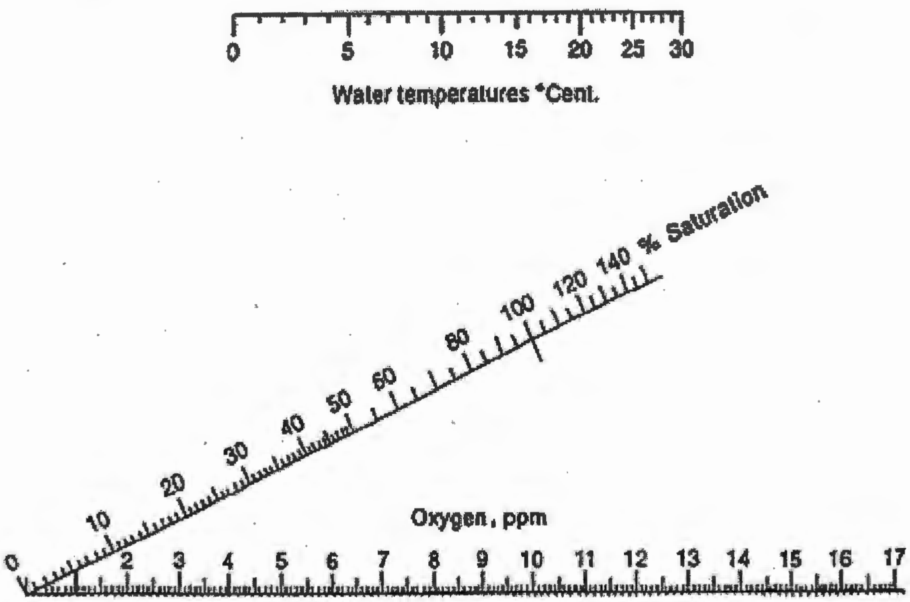
To the degree that pollution contributes oxygen-demanding organic matter (like sewage, lawn clippings, soils from streambank and lakeshore erosion, and from agricultural runoff) or nutrients that stimulate growth of organic matter, pollution causes a decrease in average DO concentrations. If the organic matter is formed in the lake, for example by algal growth, at least some oxygen is produced during growth to offset the eventual loss of oxygen during decomposition. However, in lakes where a large portion of the organic matter is brought in from outside the lake, oxygen production and oxygen consumption are not nced and low DO may become even more of a problem.

development of **anoxia** in lakes is most pronounced in thermally stratified systems in summer and ər the ice in winter when the water mass is cut-off from the atmosphere. Besides the direct effects on ıbic organisms, anoxia can lead to increased release of **phosphorus** from sediments that can fuel l blooms when mixed into the upper euphotic (sunlit) zone. It also leads to the buildup of chemically ıced compounds such as ammonium and hydrogen sulfide (H_2S, rotten egg gas) which can be toxic to ɔm dwelling organisms. In extreme cases, sudden mixing of H_2S into the upper **water column** can ;e fish kills.

olved oxygen concentrations are most often reported in units of milligrams of gas per liter of water - .. (The unit mg/L is equivalent to parts per million = ppm).

- % saturation

ȷen saturation is calculated as the percentage of dissolved O_2 concentration relative to that when ɔletely saturated at the temperature of the measurement depth. Recall that as temperature increases, oncentration at 100% saturation decreases. The elevation of the lake, the barometric **pressure**, and alinity of the water also affect this **saturation** value but to a lesser extent. In most lakes, the effect of ılved **solutes** (salinity) is negligible; but the elevation effect due to decreased **partial pressure** of en in the atmosphere as you go up (recall the breathing difficulties faced by Mt. Everest climbers) is t 4% per 300 meters (1000 feet). The DO concentration for 100% air saturated water at sea level is ıg O_2/L at 25°C (77°F) and increases to 14.6 mg O_2/L at 0°C. Use the chart below for nomagrams for lating saturation.



DETERMINING PERCENT SATURATION THE "QUICK AND EASY" METHOD

For a quick and easy determination of the percent saturation value for dissolved oxygen at a given temperature, use the saturation chart above. Pair up the mg/l of dissolved oxygen you measured and the temperature of the water in degrees C. Draw a straight line between the water temperature and the mg/l of dissolved oxygen. The percent saturation is the value where the line intercepts the saturation scale. Streams with a saturation value of 90% or above are considered healthy, but this of course is only one measure of "health". Read the rest of this section and the Lake Ecology Primer for more about dissolved oxygen in lakes. Note that this nomogram assumes that the lakes are at sea level whereas the Minnesota WOW lakes vary from 928 to 1400 feet elevation. Since gas pressures decrease with elevation, the true values will be about 5% lower for these "higher" lakes. The saturation value can also vary slightly depending on barometric pressure with lower values expected when a storm front moves through as compared to bright and sunny "high pressure" days. The RUSS and ancillary manual data in the WOW website are all corrected for this effect.

DETERMINING PERCENT SATURATION THE "NOT SO QUICK AND EASY" METHOD

There is also a series of equations you can use to calculate percent saturation. You begin by determining the equilibrium oxygen at nonstandard pressure, Cp, using the equation shown below. But even before you can do that you first need to determine the atmospheric pressure at your lake's altitude (h in kilometers) using equation 1:

Equation 1

$$\ln P = 5.25 \times \ln\left(1 - \frac{h}{44.3}\right)$$

where P= pressure (atm) at altitude h (km) relative to standard partial pressure (Pst) at 760 mm Hg or 101.325 kpa at sea level.

Now you can dive into equation 2 below. Oh, by the way, temperature in degrees K (Kelvin) is equal to temperature in degrees C + 273.15 degrees and 1 atmosphere = 760 mm Hg.

Equation 2

$$C_p = C^* \times P\left[\frac{(1 - P_{wv}/P)(1 - \theta P)}{(1 - P_{wv})(1 - \theta)}\right]$$

C_p = equilibrium oxygen concentration at nonstandard pressure, mg/L

C^* = equilibrium oxygen concentration at standard pressure of 1 atm, mg/L

P = nonstandard pressure, atm

P_{wv} = partial pressure of water vapor, atm, computed from:

$$\ln P_{wv} = 11.8571 - (3840.70/T) - (216{,}961/T^2)$$

T = temperature, °K

$\theta = 0.000975 - (1.426 \times 10^{-5} t) + (6.436 \times 10^{-8} t^2)$

t = temperature, °C

So now that you have solved for Cp you can finally determine %saturation based on your DO concentration (mg/L) by going one more step:

Equation 3

$$\%\ \text{saturation} = \frac{(100 \times DO_{mg/L})}{C_p}$$

Where DO is your measured value.

If you're an EXCEL fan you can also plug this formula that calculates Cp into your spreadsheet. You will still need to determine P (atm) at your altitude. C3 (refering to location within spreadsheet) in the equation refers to P and B7 is for water temperature (C). Once you determine Cp you then use equation 3 to determine % saturation.

```
=(($C$3*EXP(7.7117-1.31403*LN(B7+45.93)))*(1-EXP(11.8571-
(3840.7/(B7+273.15))-(216961/((B7+273.15)^2)))/$C$3)*(1-(0.000975-
(0.00001426*B7)+(0.00000006436*(B7^2)))*$C$3))/(1-EXP(11.8571-
(3840.7/(B7+273.15))-(216961/((B7+273.15)^2)))/$C$3)/(1-(0.000975-
(0.00001426*B7)+(0.00000006436*(B7^2))))
```

-ERENCES

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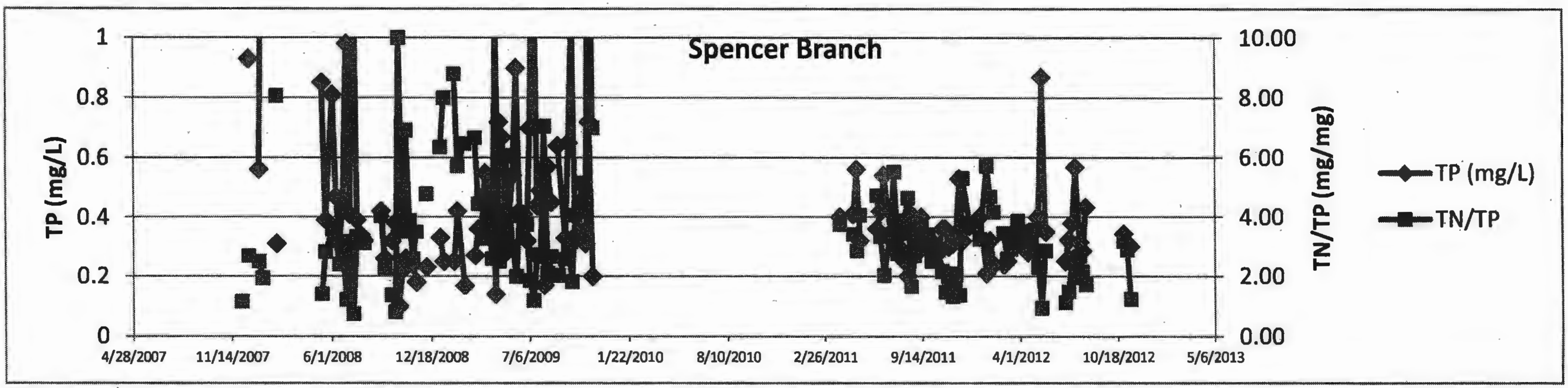
Nixon, Governor
Parker Pauley, Director

vironmental Services Program

ximum Dissolved Oxygen Concentration Saturation Table

perature grees C)	DO (mg/L)	Temperature (degrees C)	DO (mg/L)
0	14.60	23	8.56
1	14.19	24	8.40
2	13.81	25	8.24
3	13.44	26	8.09
4	13.09	27	7.95
5	12.75	28	7.81
6	12.43	29	7.67
7	12.12	30	7.54
8	11.83	31	7.41
9	11.55	32	7.28
10	11.27	33	7.16
11	11.01	34	7.05
12	10.76	35	6.93
13	10.52	36	6.82
14	10.29	37	6.71
15	10.07	38	6.61
16	9.85	39	6.51
17	9.65	40	6.41
18	9.45	41	6.31
19	9.26	42	6.22
20	9.07	43	6.13
21	8.90	44	6.04
22	8.72	45	5.95


Spencer Branch
TP (mg/L)
TN/TP (mg/mg)
1
0.8
0.6
0.4
0.2
0
10.00
8.00
6.00
4.00
2.00
0.00
4/28/2007
11/14/2007
6/1/2008
12/18/2008
7/6/2009
1/22/2010
8/10/2010
2/26/2011
9/14/2011
4/1/2012
10/18/2012
5/6/2013
TP (mg/L)
TN/TP

lessage from KMBT_C220

Davenport [wayned@franklintn.gov]
Wednesday, December 19, 2012 9:16 AM
Gary Davis
Melinda White [melindaw@franklintn.gov]
ents: Swwtpprint112121910150.pdf (177 KB)

l is a map of Franklin with the sampler locations identified. If you have further questions, don't hesitate to call.

ıavenport
: Superintendent
eclamation Facility
.-3240
ıde Yates Dr.
TN 37064

'ORIC
KLIN
ESSEE

wtpprint1@franklintn.gov [mailto:wwtpprint1@franklintn.gov]
ednesday, December 19, 2012 4:16 AM
ıe Davenport
Message from KMBT_C220

;ary Davis

:rom: Michelle Barbero <MichelleBarbero@harpethriver.org>
;ent: Thursday, August 15, 2013 9:08 AM
To: Ming.Chen Shiao; Dorie Bolze; Shannon Williams (swilliam@usgs.gov); Sherry Wang; William Melville (Melville.William@epa.gov)
:c: Gary Davis; Jimmy R. Smith; Alexandra Ewing
;ubject: RE: DO monitoring paperwork

agree completely. With this unusually wet and cool summer, we would not get an 'realistic' reading on the iver. While all data is good data and great to have, we do have limited resources for monitoring at this time. I am ;xtremely happy that we are all talking and moving in the same direction, even the permitees! This is a very important tep in the right direction.

;ecent DO data: Metro Water Services is currently monitoring the Harpeth River Watershed in Davidson county. I have ɔoked through their water quality data from the Harpeth River in Davidson County and see the following:

›ate	Time	Watershed	Site Name	Samplers (initials)	DO %	DO mg/L	Conductivity	Temperature C	pH
/24/2013	1045	Harpeth	Harpeth 1	VM/TD	80.6	6.69	401.1	25.1	7.(
/24/2013	1100	Harpeth	Little Harpeth	VM/TD	101.8	8.69	503	23.2	7.8
/24/2013	1030	Harpeth	Trace Creek	VM/TD	83.5	7.31	605	21.8	7.4
/24/2013	940	Harpeth	Harpeth 2	VM/TD	72.5	5.87	419.4	25.5	7.7
/18/2013	845	Harpeth	Trace Creek	VM/TD	63.8	5.5	653	22.1	7.:
/18/2013	815	Harpeth	Harpeth 2	VM/TD	72	5.7	431.2	26.5	7.(
/18/2013	905	Harpeth	Little Harpeth	VM/TD	89.2	7.53	526	23.7	7.8
/18/2013	937	Harpeth	Harpeth 1	VM/TD	77	6.28	422.2	26.1	7.(
/17/2013	845	Harpeth	Harpeth 2	VM/TD	72.2	5.81	429.7	25.6	7.5
/17/2013	950	Harpeth	Little Harpeth	VM/TD	99.8	8.54	534	23.2	<N
/17/2013	935	Harpeth	Harpeth 1	VM/TD	79.8	6.53	420.7	25.5	<N
/17/2013	915	Harpeth	Trace Creek	VM/TD	60.5	5.3	655	21.8	<N
/16/2013	1250	Harpeth	Harpeth 1	<Null>	90.5	7.24	417.5	25.6	7.(
/16/2013	1230	Harpeth	Trace Creek	SW	87.8	7.39	658	23.9	7.1
/16/2013	1330	Harpeth	Little Harpeth	SW	104.9	8.87	524	24.3	7.9
/16/2013	1200	Harpeth	Harpeth 2	SW	85.6	7	432.3	25.5	7.5

Michelle Barbero
atershed Science/Restoration Program Manager
ırpeth River Watershed Association

om: Ming.Chen Shiao [mailto:Ming.Chen.Shiao@tn.gov]
ınt: Wednesday, August 14, 2013 9:27 AM
ı: Dorie Bolze; Shannon Williams (swilliam@usgs.gov); Michelle Barbero; Sherry Wang; William Melville ʼlelville.William@epa.gov)

Cc: Gary Davis; Jimmy Smith (Jimmy.R.Smith@state.tn.us)
Subject: RE: DO monitoring paperwork

Dorie,

Data collected under high flow conditions are not very useful. Also, cross section measurement under high flow conditions may have safety issues. NOAA's long term forecast is still wet in Aug-Sep-Oct. May have to wait until next summer, if possible.

Ming

From: Dorie Bolze [DorieBolze@harpethriver.org]
Sent: Tuesday, August 13, 2013 12:05 PM
To: Shannon Williams (swilliam@usgs.gov); Michelle Barbero; Ming.Chen Shiao; Sherry Wang; William Melville (Melville.William@epa.gov)
Cc: Gary Davis; Jimmy Smith (Jimmy.R.Smith@state.tn.us)
Subject: FW: DO monitoring paperwork

Hello Shannon, Bill at EPA, Sherry and Ming at TDEC,

Thank you for your efforts to review the original Scope of Work for conducting a continuous water quality monitoring study this summer on the Harpeth. We received several suggestions for quality assurance from USGS and suggestions that have been incorporated into this more detailed scope of work which goes with a contract. USGS is working on incorporating more data gathered by others into their database, so we are working with them to ensure that this monitoring study can be reviewed by USGS for incorporation. Thus there has been some additional work for transects at the monitoring sites to support the location in the channel as being representative of the conditions.

Also, as of this point, the city of Franklin, and Cartwright Creek will be able to contribute funding, and Berry's Chapel utility is hoping to but has to get approval from their board. HRWA will fund the remainder.

The intent is to start the week of August 26. Thus this week, we are getting the paperwork in place with TetraTech.

But, as you all know, the weather has been unusual this year—wet and cool. All 3 sewer permittees, TDEC and others have asked that question so HRWA and USGS reviewed the data and discussed this. The plan this week, os to get some grab samples and temperature readings in the early morning at several locations in the Franklin once the hydrograph drops down after the rains. Who wants to bet on when that will be!??

So, the Notice to Proceed, is based on the conditions this year. I will provide the grab data we collect, hopefully later this week, for the final decision.

If you have a moment TODAY or Wed, please review this detailed description of the Scope of Work and let me know if you see something that needs clarifying.

Thank you!!

Dorie
Dorie
Dorie Bolze
Executive Director
Harpeth River Watershed Association
P.O. Box 1127
Franklin, TN 37065

615-479-0181 (mobile)
615-790-9767
www.harpethriver.org
Street address:
215 Jamestown Park
Brentwood, TN 37027

Protecting and Restoring the State Scenic Harpeth River and Clean Water in TN since 1999.

From: Bambic, Dustin [mailto:Dustin.Bambic@tetratech.com]
Sent: Monday, August 12, 2013 3:21 PM
To: Dorie Bolze
Cc: Ward, Tim
Subject: DO monitoring paperwork

Hi Dorie. Hope you had a good weekend. Attached is the paperwork for the DO monitoring.

You'll notice in the last section that execution of this agreement has two parts:

1. Sign the agreement
2. Send an email with a Notice to Proceed.

This will allow us to get the paperwork completed while you're waiting to pull the trigger.

Let us know which questions you have. Thanks, Dustin

Dustin Bambic, PH | Director, Water Resources | **Tetra Tech**
Direct: 615.252.4795 | Mobile: 615.618.2380 | Fax: 615.254.4507
dustin.bambic@tetratech.com

TETRA TECH, INC.

August 12, 2013

Ms. Dorie Bolze
Harpeth River Watershed Association
P.O. Box 1127
Franklin, Tennessee 37065

Subject: **Harpeth River Water Quality Monitoring**
Williamson and Davidson County, Tennessee

Dear Ms. Bolze:

Tetra Tech, Inc. (Tetra Tech) is pleased to present the Harpeth River Watershed Association (HRWA) a proposal for water quality monitoring at four locations on the Harpeth River, located in Williamson and Davidson Counties, Tennessee. Based on information supplied by HRWA, Tetra Tech has prepared the following scope of work (SOW).

SCOPE OF WORK

The proposed SOW is for approximately three weeks of continuous surface water quality monitoring at four locations along the Harpeth River. The locations were provided by HRWA and are based on the following: a draft monitoring plan prepared by HRWA; historical data collection sites used by the U.S. Environmental Protection Agency (EPA), Tennessee Department of Environment and Conservation (TDEC), HRWA, discharge permittees, and others; and U.S. Geologic Study (USGS) gauge stations. The four proposed monitoring locations are as follows:

1. Highway 96 bridge, USGS gauge station
2. Cotton Road bridge, no USGS gauge station
3. Old Hillsboro Road bridge, no USGS gauge station
4. Highway 100 bridge, USGS gauge station

The following tasks comprise the SOW.

Task 001 – Project Setup and Preparation of QAPP/SOP and HASP

Tetra Tech will modify the existing TDEC Division of Water Pollution Control (WPC) *Quality System Standard Operation Procedure (SOP) for Chemical and Bacteriological Sampling of Surface Water*, dated August 2011, to develop a Quality Assurance Project Plan (QAPP)/SOP for the proposed Harpeth River monitoring.

Tetra Tech will prepare a site-specific health and safety plan (HASP) for the project to address safety issues associated with the installation of the water quality monitoring sondes and semi-weekly data collection. The HASP will be prepared to ensure that safe working conditions exist at the sites during these activities. The elements of the HASP will be based on the requirements described in the Occupational Safety and Health Administration (OSHA) rules (29 Code of Federal Regulations [CFR] 1910). The plan will address the

712 Melrose Avenue, Nashville, TN 37211
Tel (615) 254-4559 Fax (615) 254-4507
www.tetratech.com

potential hazards associated with the field activities and the personnel protection measures selected in response to these hazards.

This task will also include project setup activities and preparation/purchase of sonde installation materials.

Task 002A – Multi-Parameter Sonde Rental and Installation

Tetra Tech will rent four YSI 6920-V2 Multi-Parameter sondes from Pine Environmental Services Inc. and install the units at the four proposed locations identified previously. The sondes will be placed in a protective Schedule 80 polyvinlyl chloride (PVC) casing, which will be affixed to a metal post driven into the stream bed, according to the TDEC WPC SOP. The PVC casing will be perforated at the casing bottom for a flow-through design. The sondes will be secured using galvanized steel cable, to facilitate raising or lowering the sonde due to changes in river depth/flow.

The sondes will be placed near mid-stream, at mid-depth. Tetra Tech will attempt to minimize the visibility of the sondes, in an effort to reduce impacts to the river aesthetics and to reduce potential device tampering and/or vandalism.

Task 002B – Water Quality Monitoring

The proposed monitoring period is three (3) weeks from the time of installation. The sondes will perform continuous monitoring using an internal data logger for the following parameters:

- Depth,
- Conductivity,
- Temperature,
- Dissolved Oxygen (DO), and
- Turbidity

Tetra Tech will visit each location during one day, twice per week to download the sonde data. The TDEC SOP for long term DO monitoring will be followed for data collection procedures. During each visit, Tetra Tech will also perform sonde calibration and parameter crosschecks using a YSI 556 Multi-Parameter instrument and a Lamotte 2020 turbidity meter. Three channel cross sections will be measured once at the beginning and once at the end of the monitoring period at each of the four locations. The cross section locations include upstream of the sonde location, at the sonde location, and a downstream location. If necessary, equipment adjustments and/or repair will be conducted during the semi-weekly visits. Field data forms, consisting of parameter logs, crosscheck data forms, and calibration logs, will be prepared during each site visit. During the final semi-weekly visit, the sondes and mounting materials will be removed.

Task 003 – Technical Memorandum

Tetra Tech will prepare a brief technical memo summarizing the project results. The memo will include:

- Summary of field activities and observations;
- Figure depicting monitoring locations;
- Field data summary table;
- DO field data summary table with comparison to TDEC DO criteria;

- Data graphs; and
- Flow data from upstream and downstream USGS gauge stations to estimate flow rates at the monitoring locations with no USGS gauge station.

It is estimated that the technical memo will be available approximately 15 business days following the last monitoring visit.

ASSUMPTIONS

- The proposed cost is based on the SOW provided here. Alterations to the SOW, either by HRWA or a regulatory party, may affect project cost;
- HRWA will obtain access agreements if access to monitoring locations is restricted due to private property;
- Tetra Tech will not be responsible for data loss or unusable data due to loss of sondes, equipment failure, monitoring location access restrictions, drought conditions, or flooding; and
- Accessibility for personnel and equipment on-site will not be hampered by site-, earthquake-, or weather-related conditions;

Cost

Tetra Tech has estimated the lump sum total cost, based on the SOWs as described in this document, at $19,500. The cost estimate will not be exceeded without prior approval.

We can begin this project upon receiving your authorization to proceed. To expedite this project, please send a copy of the attached agreement, signed, by facsimile to (615)-254-4507. After execution of the agreement, work will not begin (no costs will be incurred) until an electronic Notice To Proceed is provided to Tetra Tech from HRWA.

We appreciate the opportunity to provide this proposal of services for your consideration. If you have any questions concerning these services or require adjustment to our approach or schedule please do not hesitate in contacting Mr. Tim Ward at (615) 252-4791 or tim.ward@tetratech.com.

Our payment terms are net due thirty (30) days from the date of the invoice, regardless of the status of the case. Interest at the rate of 1.5% per month will be charged on balances not paid within thirty days.

Sincerely,

Tetra Tech, Inc.

Tim Ward

Tim D. Ward
Environmental Scientist

Attachments
Tetra Tech Professional Services Contract

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

PROJECT:	Harpeth River Monitoring	**TETRA TECH, INC. TIN:**	95-4148514		
CLIENT:	Harpeth River Watershed Association (HRWA)				
ADDRESS:	P.O. Box 1127, Franklin, Tennessee 37065				
INVOICING ADDRESS:	P.O. Box 1127, Franklin, Tennessee 37065				
PROJECT CONTACT:	Dorie Bolze	**TEL:**	410.513.8727	**FAX:**	410.642.7101
PAYMENT CONTACT:	Dorie Bolze	**TEL:**	410.513.8727	**FAX:**	410.642.7101
CONSULTANT:	**TETRA TECH, INC.**				
ADDRESS:	712 Melrose Avenue				
	Nashville, TN 37211				
TECHNICAL CONTACT:	Tim Ward	**TEL:**	615-252-4791	**FAX:**	615-254-4507
Contractual CONTACT:	Ron Grover	**TEL:**	615.252.4790	**FAX:**	615.254.4507
PAYMENT ADDRESS:	**Tetra Tech, Inc., PO 901642, Denver, CO 80291-1642.**				
PROJECT DESCRIPTION:	Perform three week surface water quality monitoring of 4 locations on the Harpeth River				

☒ **SCOPE OF SERVICES/PERIOD OF PERFORMANCE (See Attachment)**

☐ **PRICE SCHEDULE (See Attachment)**

TERMS AND CONDITIONS

1. DEFINITIONS AND CONTRACT FORMATION.

(a) **"Client"** shall mean the person or entity identified in the Tetra Tech, Inc. "TT" Proposal for whom Services are to be performed.

(b) **"TT"** shall mean Tetra Tech, Inc.

(c) **"Client Order"** shall mean the purchase order, request, authorization or other notification, and additions or modifications thereto whereby Client indicates its desire that TT furnish Services.

(d) **"TT Proposal"** shall mean these terms and conditions and the letter, proposal, quotation, or other notification, including any response to the Client Order, wherein TT offers to furnish Services.

(e) **"Services"** shall mean the Services of TT personnel described in the TT Proposal or Client Order and any other Services as may be added to, or performed in connection with, the Contract provided, however, that TT shall have no responsibility as a generator, operator, transporter, disposer or arranger of the transportation and/or disposal of Hazardous Substances as defined in Article 7 below.

(f) **"Contract"** shall mean these Terms and Conditions and the TT Proposal, and shall include, only to the extent not inconsistent with any aspect of the TT Proposal and these Terms and Conditions, the provisions of the Client Order. Upon execution by Client or commencement of Services at Client's request, TT's Proposal and these Terms and Conditions shall constitute a binding Contract and govern exclusively any Services provided.

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

2. COMPENSATION.

☒ **LUMP SUM.** Compensation for these Services shall be a Lump Sum of $ 19,500 .

☐ **TIME AND MATERIALS.** Funding for these Services will not exceed $__________ unless increased in accordance with this Contract and will be based on the following option (per the attached Scope of Services or List of Hourly Rates); plus Reimbursable Expenses times a factor of __________ and subcontractor/vendor Expenses times a factor of __________; TT's Direct Job Wages times a factor of __________.

☐ **COST PLUS FIXED FEE.** Compensation for these Services shall be TT's cost plus a fixed professional fee, including reimbursable expenses times a factor of __________; TT's Direct Job Wages times a factor of __________; plus subcontractor/vendor expenses times a factor of __________. The estimated compensation for Services is $__________; plus a fixed fee of $__________; for an estimated total of $__________.

Direct Job Wages or Hourly Rates for Time and Materials or Cost plus Fixed Fee contracts are subject to change to reflect adjustments in TT's salary levels.

In the event services beyond those specified in the Scope of Services and not included in the compensation above are required, TT shall submit a cost estimate for such services and a contract modification for cost and fee shall be negotiated and approved by the Client. TT may perform such additional efforts prior to the execution of such modification, but is not required to.

TT shall be compensated in accordance with TT's Proposal and the terms of this Article. TT's invoices are rendered monthly and are payable upon receipt. **Payment shall be made to the following address: Tetra Tech, Inc., PO 901642, Denver, CO 80291-1642.** Interest shall accrue at the rate of two percent (2%) over prevailing prime rate shall be charged on a monthly basis (or the maximum percentage allowed by law, whichever is less) on any amounts not paid within thirty (30) days of invoice submittal. In the event legal action is necessary to enforce the provisions of this Contract, TT shall be entitled to collect from the Client any judgment or settlement sums due, reasonable attorneys' fees, court costs and expenses incurred by TT in connection therewith and, in addition, the reasonable value of TT's time and expenses spent in connection with such action, computed at TT's prevailing fee schedule and expense policies. TT may, but is not required to, terminate its services if any invoice is unpaid for sixty (60) days. TT, its officers, employees, or consultants may be asked or required to appear as a witness or deponent, to furnish information or data through interrogatories, or otherwise be compelled to participate in, administrative or judicial proceedings arising in connection with Client's project. In that event and notwithstanding expiration or termination or this Contract, Client shall compensate TT in accordance with this Article and reimburse TT for reasonable legal expenses incurred in connection therewith, provided, however, that the provisions of Article 5, below, shall govern in the event TT is found to be at fault.

3. CONFIDENTIALITY, ACCESS TO SITE, USE OF FACILITIES AND INFORMATION. Client shall provide TT with access to facilities and information conducive to the efficient and accurate provision of Services, including such maps, drawings, records, and site access as are needed for the proper conduct of the Services, and shall indicate the reliability of all information provided. TT will maintain in confidence and return to Client any information designated by Client as confidential. If site visits are included in the Scope of Services, but not field construction or remediation, TT INC. shall visit the project and/or construction site at appropriate intervals to become generally familiar with the progress, quality of work (contractors' work) and if applicable to determine if the work is proceeding in general accordance with the Contract Documents. Visits to the project site and observations made by TT as part of Services during construction under Agreement shall not make TT responsible for, nor relieve the construction contractor(s) of the obligation to conduct comprehensive monitoring of the work sufficient to ensure conformance with the intent of the Contract Documents, and shall not make TT responsible for, nor relieve the construction contractor(s) of the full responsibility for all construction means, methods, techniques, sequences, and procedures necessary for coordinating and completing all portions of the work under the construction contract(s) and for all safety precautions incidental thereto.

4. INSURANCE.

(a) During the course of performance of the Services, TT will maintain the following insurance coverages:

TYPE OF COVERAGE	AMOUNT OF COVERAGE
Workers' Compensation/Employers Liability	Statutory/$1,000,000
Commercial General Liability/Excess Liability	$1,000,000/$2,000,000
Professional Liability/Contractors Pollution Liability	$1,000,000
Automobile Public Liability and Property Damage, including coverage for all hired or non-owned automotive equipment used in connection with the insured's operations.	$1,000,000

(b) If required, TT shall deliver to Client, Certificates evidencing that the above coverages are in effect and will not be canceled or materially changed without thirty (30) days written notice; (c) Additional Coverages: If desired, TT, will on a cost-reimbursable basis, endeavor to procure other desired insurance coverages if commercially available and applicable to the work being performed.

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

5. **INDEMNIFICATION**. TT shall indemnify and save harmless Client from claims, actions and judgments arising out of bodily injury, death or damage to property of third parties to the extent caused by the negligence of TT, provided, however, that "Hazardous Substance Claims" as defined in Article 7, below, shall be governed by that Article.

6. **WARRANTY OF SERVICES**. TT warrants that TT and its employees shall, in performing Services hereunder, exercise the degree of skill, care and diligence consistent with customarily accepted good practices and procedures at the time and location and for the type of Services performed. Should TT fail to perform to those standards, it shall (a) without cost to Client, reperform and correct any substandard Services; and (b) reimburse Client for Client's direct damages or otherwise correct faulty construction, to the extent resulting from such substandard Services. Services involving such activities as the prediction of ecological or health impacts, clean-up criteria, extent or degree of contamination or dispersion, air or water movement, geologic and hydrogeologic conditions, extent of appropriate investigation, scheduling, and cost estimating are highly sensitive to changes in regulatory and scientific criteria, methodologies and interpretations thereof and require the balance of diverse, often conflicting, Client business, economic, legal and other priorities. Client acknowledges these conditions and accepts the risk that, although TT may perform to the above standards, the Client's goals or desires may nevertheless not be realized. TT makes no other warranties, express or implied, with respect to its performance under this Contract. TT's liability hereunder, including any for damage to or loss of Client property, shall in no event extend beyond one year after completion of the Services in question or exceed the amount specified in Article 8 below.

7. **HAZARDOUS SUBSTANCE CLAIMS**. (a) In the event that TT's negligence is found, by final judicial determination, to have caused a Hazardous Substance Claim as defined below, TT shall reimburse Client for its costs and liabilities incurred under this Article 7, to the extent caused by TT, in an amount not to exceed that specified in Article 8 below; (b) "Hazardous Substance Claim" shall mean any and all claims, losses, costs, expenses, judgments, damages, and liabilities of any form or nature including but not limited to any for personal or emotional injury, death or damage to property arising out of or in connection with any actual, threatened or feared release, discharge or exposure to any toxic or hazardous waste, substance, material, or vapor, including without limitation, PCB's, petroleum, hydrocarbons, asbestos, mixed, radioactive or nuclear wastes and any other substance designated as hazardous or toxic under CERCLA, TSCA, RCRA or other statute or regulation ("Hazardous Substances"); (c) Except as provided in (a). above and to the fullest extent provided in Article 9 below (i) Client shall indemnify and hold harmless TT, its officers, directors, employees, agents, and representatives from and against any and all Hazardous Substance Claims; and (ii) Client shall defend any claim, action, or proceeding which may be brought against TT, its officers, directors, employees, agents, and representatives ("Defendants") arising out of or in connection with any Hazardous Substance Claim and shall bear all fees and expenses of attorneys and costs any Defendant incurs in the defense thereof.

8. **TT LIABILITY**. TT's total aggregate liability in connection with or arising out of the Contract or Services, including without limitation any under Articles 5, 6 and 7 above, shall in no event exceed the total amount of compensation paid to TT hereunder up to a total maximum amount of $250,000.

9. **CONSEQUENTIAL DAMAGES AND OTHER LIABILITIES**. TT and its employees shall in no event be liable for any special, indirect or consequential damages, including specifically but without limitation, any based on loss of profits or revenue, loss of or interference, whether or not by third parties, with full or partial use of any equipment, facility or property, including real property, cost of replacement power, energy or product, delay in or failure to perform or to obtain permits or approvals, cost of capital, loss of goodwill, claims of customers, fines or penalties assessed against client or similar damages. These terms provide allocations of risk and reward consistent with the nature and extent of the Services and to that end include (i) protections against, and limitations on, liability of TT and (ii) specific remedies of Client which shall be its sole and exclusive remedies. The allocations, including without limitation those set forth above and under Articles 6, 7, 8 and 13, shall survive this contract and apply to the fullest extent allowed by law irrespective of whether liability of TT is claimed, or found, to be based in contract, tort or otherwise (including negligence, warranty, indemnity and strict liability) and Client hereby waives all rights of recovery and assumes all risks beyond those explicitly allocated to TT herein.

10. **SITE CONTRACTORS**. For the benefit of Client and TT, Client agrees that it will cause provisions acceptable to TT governing insurance and indemnity to be inserted in each of Client's agreements for remediation or other construction or site services or work related to the Services.

11. **DELAYS**. Neither party shall be considered in default in the performance of its obligations hereunder to the extent that the performance of such obligations is prevented or delayed by any cause which is beyond the reasonable control of the affected party, and the time for performance of either party hereunder shall in such event be extended for a period equal to any time lost as a result thereof, and an equitable adjustment shall be made to TT's compensation.

12. **THIRD PARTY INTERESTS**. This Contract and the Services and Work Product produced hereunder are solely for the benefit of Client and are not intended to be for the benefit, or to be construed as creating rights in favor, of any third party. If Client is not the ultimate beneficiary of the Services or TT's work product is used in such a way as to create or induce any reliance by any third party, Client represents and warrants (i) that it shall bind its clients and/or such third parties to limitations on and protections against liability "protective provisions" commensurate with those afforded TT hereunder and that such protective provisions will, in fact, inure to the benefit of TT, and/or (i) that Client has the power to act on behalf of its clients and/or such third parties and does hereby bind such parties to these protective provisions.

13. **CHANGES AND TERMINATION**. This Contract shall not be modified except by written agreement signed by both parties. Client shall have the right to make changes within the general scope of Services upon execution of a mutually accepted change order. Client shall also have the right to terminate this Contract prior to completion of the Services, after reasonable notice to TT in writing, in which event Client shall pay TT all amounts due TT hereunder up to the effective date of termination, plus TT's reasonable costs incurred after such date in terminating the Services. In the event that Client alleges breach on behalf of TT, Client shall afford TT in 30 days written notice to submit a reasonably acceptable plan to cure any alleged deficiency prior to termination. Recognizing that termination prior to completion may involve risks and exposures both as to cost of work and third party claims, Client shall in such event indemnify, protect and defend TT from claims arising out of any incomplete aspect of the Services. Both parties have the right to terminate this Contract for convenience with thirty (30) day notice to the other party.

14. **GOVERNING LAW, PRECEDENCE AND DIVISIBILITY**. Unless specified otherwise in Client orders, this Agreement shall be governed by the laws of the State of California excluding choice of law rules, which direct application of the laws of another jurisdiction. The provisions of the TT Proposal and these Terms and Conditions shall govern exclusively any Services furnished by TT and shall prevail over and render void any inconsistent or conflicting provision of the Client Order. If any term,

TETRA TECH, INC.
PROFESSIONAL SERVICES CONTRACT

condition, provision or portion of this Contract is declared void or unenforceable, or limited in its application or effect, such event shall not affect any other provision or portion hereof. All other provisions and unaffected portions thereof shall remain fully enforceable and an adjustment in the compensation or other provisions shall be made with the purpose of equitably affecting the intent of the Contract to the maximum extent allowed by law.

15. **ENTIRE AGREEMENT**. This Contract contains the entire agreement between the parties as to the Services rendered hereunder. All previous or contemporaneous agreements, representations, warranties, promises, and conditions relating to the subject matter of this Contract are superseded by this Contract.

TETRA TECH, INC. – Accepted by:

Harpeth River Monitoring
CONTRACT OR PROJECT NAME

Tim Ward
BY TT (PRINT NAME)

Environmental Scientist
TITLE

Tim Ward / 08/12/2013
SIGNATURE /DATE

CLIENT – Accepted by:

HRWA
CLIENT

Dorie Bolze
BY (PRINT NAME)

Executive Director
TITLE

SIGNATURE /DATE

Gary Davis

From:	Dorie Bolze <DorieBolze@harpethriver.org>
Sent:	Tuesday, July 02, 2013 6:48 PM
Subject:	Resend--Comments on draft NPDES sewer treatment plant permits on the Harpeth River in TN
Attachments:	Harpeth River Basin draft Watershed Monitoring Plan.pdf; Harpeth River Basin Monitoring for MS4_NPDES_2012.jpg; HRWA and SELC Request for Public Hearing 6-27-13.pdf

TO: TDEC, USGS, EPA Region IV, USFWS, and TWRA, city of Franklin, Berry's Chapel Utility and Cartwright Creek Utility

HRWA has been working on developing a solid draft for a Harpeth river basin water quality monitoring plan and a structure and timeline for implementing it as part of everyone's interest to have more data on the Harpeth to guide important long range sewer and drinking water planning, growth, and water quality improvement in the river. We circulated a compilation of dissolved oxygen data on the Harpeth, draft monitoring plan, examples of Technical Advisory Committee structures and other material in February. HRWA has also met with or talked to many interested parties and experts over the past year.

In April, TDEC issued drafts of the three NPDES sewer permits on the Harpeth. Attached are the comments HRWA has provided to TDEC on the draft permits and a copy of the draft Harpeth River Monitoring Plan from the prior email. We are very appreciative of the time many people have already given to discussing, exploring, and considering the material we have compiled. The draft permits have incorporated the important need for improved data on the river and other aspects.

We are very interested in continuing to work on implementing the instream studies in a coordinated fashion based on a watershed monitoring plan that has been developed and adopted based on collaborative input for all relevant entities and experts. This summer is a very opportune time to deploy in-stream dissolved oxygen continuous monitors at four locations to collect needed data. Much of this could be done this summer under the existing permit requirements. This data will be very important to refining the monitoring plan and efforts so that the permittees and others partners in this effort can focus their efforts and funding effectively.

Below my signature is the memo from February which provides more background. Please do not hesitate to contact me for copies of any specific material we have circulated.

Dorie Bolze
Executive Director
Harpeth River Watershed Association
615-479-0181
(full signature at the bottom of this email)

MEMORANDUM SENT February, 14, 2013:

TO: TDEC, USGS, EPA Region IV, USFWS, and TWRA, city of Franklin, Berry's Chapel Utility and Cartwright Creek Utility, Williamson County, Metro Nashville stormwater program

RE: Harpeth river basin monitoring study and concept for a Technical Advisory Committee to manage water quality monitoring-
Consideration as part of the upcoming renewals for the three sewer permit renewals and funding a continuous water quality effort with USGS gages as next steps

HRWA has been working on developing a solid draft for a Harpeth river basin water quality monitoring plan and a structure and timeline for implementing it as part of everyone's interest to have more data on the Harpeth to guide important long range sewer and drinking water planning, growth, and water quality improvement in the river. Ever since the founding of HRWA, we have been working with all of the various state and federal agencies, local governments and permittees on how to improve the river's water quality during the summer low flow conditions. Several things have been the impetus for HRWA's interest in working on establishing a water quality monitoring plan and a Technical Advisory Committee to oversee the plan's development and implementation and well as manage any water quality modeling on the river.

1. Ten years of Dissolved Oxygen (D.O.) data on the Harpeth gathered through various efforts by TDEC, EPA, HRWA, city of Franklin and others demonstrate that the mainstem for nearly 80 river miles does not meet water quality standards on a regular basis during the river's summer low-flow season. (See attached ppt of Compiled DO data and map for details.) The river does not meet state D.O. standards even though the city of Franklin is discharging at about half of the pollutant loads set by the EPA's TMDL in 2004. The city's effluent is highly treated to concentrations well below current permitted limits and the city has an active effluent reuse program. It appears, from field data and the EPA TMDL modeling work that when the river is naturally low flow, that the small discharges from the two small sewer plants downstream also cause a sag (or drop) in the D.O. levels even though their loads are much smaller than the city of Franklin's inputs.

2. The city of Franklin has recently completed a detailed Integrated Water Management Plan process that looked at long-range planning for sewer (to increase capacity from 12 MGD to 24 MGD over time), drinking water, stormwater management, and stream restoration to hopefully improve water quality of the Harpeth in the city and downstream. Many of the agencies, HRWA and others were advisors as stakeholders during that effort. Of the several valuable outcomes from the effort is the development of a new river model that could be the basis of water quality modeling with new and more field data. TDEC TMDL modeling staff have worked with the consulting firm on this and are familiar with the work which they could take on if such decisions were made.

3. The Harpeth lowhead dam has been removed which changes the river's flow dynamics that the EPA had to contend with during their water quality modeling effort for the TMDL for nutrient enrichment/low dissolved oxygen. The nationally recognized river restoration demonstration project was a very successful collaboration of so many state and federal agencies, the city, HRWA, and others.

4. During the city of Franklin's IWRP, the consulting firm said it is was necessary to get more data on the river to be able to develop a water quality model to do any "what if" scenarios. Their work was a screening level effort only since there was little field data to work with.

5. The 3 NPDES sewer permits were written so that all 3 would be on the same cycle to enable watershed based permitting and were set to renew at the end of 2011 to keep to the original 5 year This way the outcomes of the IWRP and other efforts could provide input for adjusting the permits in a short time frame. TDEC staff are working on these 3 sewer permits renewals and have been reaching out to the permittees, HRWA and others for input on in-stream monitoring needs. The MS4 phase I and phase II permits have water quality monitoring requirements. These stormwater programs in the Harpeth are exploring how to integrate their monitoring efforts cost effectively and for the best management value.

\s a result, one key common theme that HRWA has been pursuing and discussing is how to get high quality water quality lata and to create a collaborative management and decision-making process among the agencies, permittees, water quality experts and conservation organizations to develop, implement, and interpret water quality monitoring data. This ıas been the impetus behind our work this past summer and fall to develop a water quality monitoring plan and to look or approaches around the country for technical advisory teams that manage water monitoring, water quality modeling ınd TMDL development.

'his fall, HRWA even prepared a proposal in hopes of getting funding on behalf of this effort to form and coordinate a 'echnical Advisory Committee and fund a year of USGS continuous monitoring at 6 sites for flow and new water quality ıarameters and even for a one time much needed river modeling study. Though the proposal was not funded by the TN lealthy Watershed Initiative, the effort highlighted interest by TDEC's modelers, the permittees on various levels, the ISGS, and others.

s a result, the USGS in December has committed $80,000 more of their funds to help launch a continuous water quality ıonitoring effort based on 6 stations that could be matched with the continuing support of current sponsors like TDEC, ıe city of Franklin, TDOT and by including other permittees. This is a great opportunity! This would be an effective way for more robust and needed water quality monitoring to get launched by this summer with a shared responsibility among the sewer and even the stormwater permittees and current state and federal sponsors.

With TDEC interested in developing new draft NPDES sewer permits, HRWA has pulled this material together to be considered in discussions for how the permit renewals can help move the effort forward. There is plenty of background in the attached material so I won't go into any more detail in this email cover memo. HRWA would gladly help convene members of the various agencies, permittees (sewer and stormwater jurisdictions), experts and others interested parties for a discussion of these approaches and use these materials as a starting point for discussion. All of our goals align in wanting the river to meet water quality standards. We think that focusing on establishing a basin wide monitoring plan and a TAC to manage the process would create the foundation for integrated efforts that will be needed to find and implement the best cost effective options and in a timely fashion so that the Harpeth River improves in water quality.

The attached material include:

1. HRWA letter to Gary Davis, TDEC, on these points as part of consideration for the NPDES sewer permit renewal
2. Draft Harpeth River Watershed Monitoring Plan and map of site locations
3. Table of USGS continuous water quality and flow monitoring at 6 sites—breakdown of costs and what is needed
4. Examples of Technical Advisory Committees from various locations in the country
5. Draft of permit language for the 3 NDPES permits focused on in-stream water quality monitoring and the TAC
6. Compilation of 10 years of continuous dissolved oxygen data on the Harpeth (pdf) and map of sampling locations.

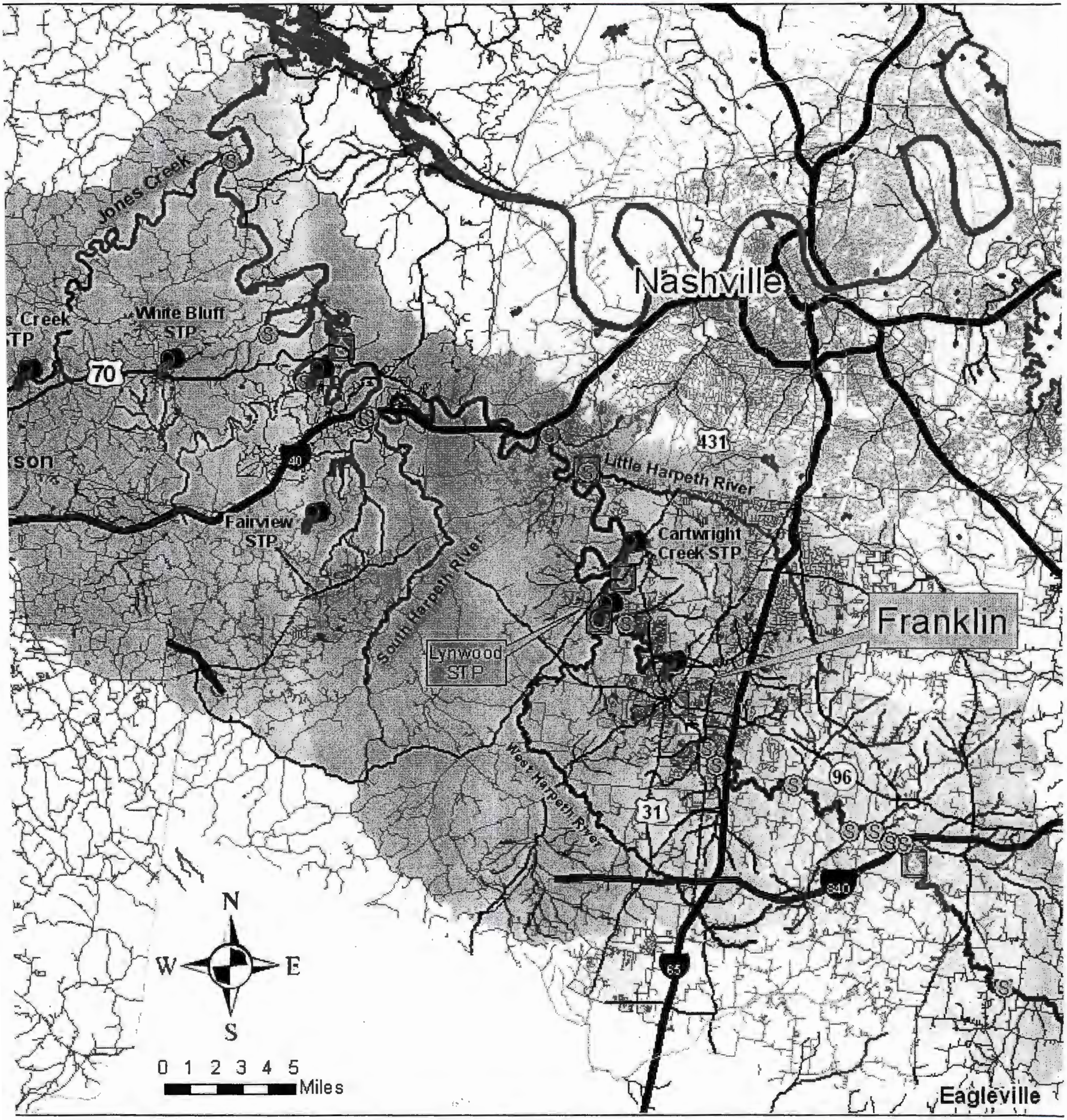
Thank you all very much and we look forward to continuing the discussions.

Dorie

Dorie Bolze
Executive Director
Harpeth River Watershed Association
P.O. Box 1127
Franklin, TN 37065
615-479-0181 (mobile)
615-790-9767
www.harpethriver.org
Street address:
215 Jamestown Park
Brentwood, TN 37027

Protecting and Restoring the State Scenic Harpeth River and Clean Water in TN since 1999.

arpeth River Basin Monitoring Locations



nd

Harpeth River STPs

Continuous Monitoring and Weekly Grab

Sub-Watershed Basin Monitoring

Water Treatment Intake

303d Listed Streams

Select Tributaries

Interstate

Harpeth River

MajorTributaries

Harpeth River Watershed

Southern Environmental Law Center

2 Victory Avenue, Suite 500
Nashville, TN 37213
615-921-9470
Fax 615-921-8011
SouthernEnvironment.org

June 27, 2013

Mr. Gary Davis
Tennessee Dept. of Environment and Conservation
Division of Water Pollution Control
6th Floor, L&C Annex
401 Church Street
Nashville, TN 37243

Re: Request for public hearing on three draft NPDES permits: City of Franklin (TN0028827), Berry's Chapel Utility STP (TN0029718), and Cartwright Creek (TN0027278)

Dear Mr. Davis:

On behalf of the Harpeth River Watershed Association ("HRWA") and the Southern Environmental Law Center ("SELC"), we respectfully request a public hearing on three draft NPDES permits: City of Franklin (TN0028827), Berry's Chapel Utility STP (TN0029718), and Cartwright Creek (TN0027278). We submit this request within the period allowed for public comment on each of the three drafts. *See* Tenn. Comp. R. & Regs. ~~1200-04-05-.06(12)~~ (providing that interested persons may request a public hearing within the period allowed for public comment); Email from Gary Davis to Dana Wright (May 10, 2013) (extending the public comment period for the TN0028827, TN0029718 and TN0027278 drafts).

HRWA and SELC have established interests in these three draft permits. As documented in the attached letter from Dorene Bolze, HRWA has carefully analyzed and commented upon NPDES permits for the sewage treatment plants at issue for the last several permit cycles. SELC helped to negotiate the consent decree that led to the establishment of Total Maximum Daily Loads ("TMDLs") for the Harpeth River Watershed. HRWA and SELC are both interested in ensuring that permit terms are adequately protective of water quality in the Harpeth River Watershed, and in ensuring that robust monitoring regimes are in place. HRWA and SELC also share an interest in ensuring that permitted discharges are consistent with TMDLs for various pollutants in the Harpeth River Watershed.

We submit that a public hearing is warranted because these three draft permits directly affect diverse stakeholders, including customers of the three sewage treatment plants, people who live along the Harpeth River, and people who recreate in it. A public hearing would allow these different groups to share valuable information and analyses with TDEC. Furthermore, we submit that a joint hearing on all three draft permits is warranted because, as evidenced by TDEC's decision to place the three permits on the same permit cycle and to hold a joint hearing on them in 2010, the drafts present interrelated issues. Finally, as described in more detail in the attached letter from Dorene Bolze, there is demonstrated public interest in having a hearing.

In closing, we respectfully request that, should our request for a public hearing be granted, the hearing be held no earlier than the first week of September 2013. Such timing would allow interested members of the public to analyze the complex issues at stake and prepare more succinct, constructive comments on those issues. It would also allow more robust public participation as it would not conflict with summer vacations or the beginning of the school year.

Thank you for considering our request. If you have any questions, please contact Anne Davis at 615-921-9470 or Dorene Bolze at 615-790-9767.

Respectfully submitted,

Delta Anne Davis
Managing Attorney
Nashville Office

Gwen Parker
Staff Attorney

cc: Dorene Bolze
Vojin Janjic
Wade Murphy

HARPETH RIVER
WATERSHED ASSOCIATION

May 21, 2012

Mr. Gary Davis
Tennessee Dept. of Environment and Conservation
Div. of Water Pollution Control
6th Floor, L&C Annex
401 Church St.
Nashville, TN 37243

Re: Proposed Harpeth River Basin Water Quality Monitoring Plan

Dear Mr. Davis,

Thank you for keeping us informed of your efforts toward drafting the renewals of the NPDES permits for the sewage treatment plants for the Cartwright Creek Utility, Berry's Chapel Utility, and the City of Franklin. You mentioned that you were reaching out to the permittees, HRWA and others to receive information that would be pertinent to the permit reissuance. One area of interest was that of expanding the need for water quality monitoring in the Harpeth River.

Please find attached a monitoring plan for the Harpeth River Basin that also includes some background regarding the dissolved oxygen monitoring data from the last ten years, relevance to EPA's 2004TMDL on the Harpeth River for nutrient enrichment/low dissolved oxygen, and the upcoming permit renewals. You may recall that in our two sets of comments on the permit renewals issued in 2010 that HRWA recommended the need for basin –wide monitoring in the Harpeth. We have also provided two maps to help you visualize locations of both the proposed sites for water quality monitoring and the locations of dissolved oxygen monitoring sites.

In addition please see the copy of our recent AWRA presentation on dissolved oxygen monitoring over the past ten years by various entities. It includes the charts, as well as notes on the limitations and problems with both modeling work done on the Harpeth, and important flow analysis of the Harpeth during the summer low-flow conditions. I will not go into detail here on our findings since that has been covered at length in prior comments that we have provided to TDEC during past permit renewals, in our several Harpeth river Dissolved Oxygen studies that have been provided to TDEC, and summarized in the accompanying monitoring plan. TDEC has attached much of our comments to the recent NPDES permit renewals which included charts of Dissolved Oxygen data through 2008. We have provided an excel spreadsheet for you of all continuous and 24/hour dissolved oxygen data as well so you have charts, summary tables, and the raw data for EPA's, TDEC's, and HRWA's datasets as well as a river low flow analysis.

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The enclosed Harpeth River basin monitoring plan includes a list of all NPDES sewage treatment plants permittees, storwmater permittees, and Eagleville who all need to be responsible parties for the monitoring plan since these entities contribute and can address much of the pollutant load into the river system. The three NPDES sewer plant permittees would not be the only responsible entities to implement this plan. This plan needs to be included in these NPDES permit renewals, but also all of the other entities need to be brought in as well as part of their permit responsibilities.

Also, the 3 NPDES sewer plant permits need to have this language included so that they are similar to other TDEC NPDES permits such as the General Construction Permit:

"This permit does not authorize discharges that would result in violation of a state water quality standard (TDEC rules, Chapters, 1200-4-3 and 1200-4-4). Such discharges constitute a violation of the permit."

Lastly, as pointed out in the monitoring plan, dissolved oxygen in the river is below state standards above and below each of the NPDES sewage treatment plant permit discharge locations. The permits limits were set last cycle tied to the EPA TMDL, yet dissolved oxygen violations in the river continue. This is happening because the TMDL has set the pollutant load allocations too high overall. We have provided detailed analysis to TDEC regarding this. For example, the city of Franklin is currently discharging in the summer at loads much less than the TMDL has set for it. Yet, the river's dissolved oxygen levels nearby downstream do not reach standards as seen in the river monitoring data. The city's permit renewal needs to have concentrations reduced so that the load allowed by the permit is less than the current permit and would still be within the city's ability to meet because of its high treatment capabilities. The city's permit renewal application reports CBOD5 of 1.42 mg/l for its average daily discharge while the permit limit is 4 mg/l. Setting the renewed permit at this lower achievable concentration at the current 12 MGD design capacity will reduce the load limit and move in the right direction for reducing the load into the river in the summer. Similar conditions should be reviewed for the other two sewer plants as well and other parameters should be reviewed also.

Please don't hesitate to contact me to discuss the monitoring plan. HRWA is very interested in assisting in pulling the entities together and setting up the system for the implementation of the monitoring plan.

Sincerely,

Dorene Bolze

Dorene Bolze
Executive Director
(615) 479-0181

HARPETH RIVER
WATERSHED ASSOCIATION

Attachment:

*Harpeth River Basin Water Quality Monitoring Plan
*Map of Monitoring Plan Site locations
*Map of Dissolved Oxygen monitoring done by HRWA, TDEC, and city of Franklin
*HRWA presentation at the April 2012 AWRA TN conference. "The State of the Harpeth River: Taking the River's Pulse. Ten Years of Dissolved Oxygen Monitoring."
* excel spreadsheet of all continuous and 24/hour collected dissolved oxygen data.

Cc: Sherry Wang, TDEC TMDLs
Vojin Janjic, Permit Section, Water Pollution Control, TDEC
Saya Qualls, TDEC
Shari Meghreblian, Deputy Commissioner
Tom Melville, EPA, Region IV

P.O. Box 1127 ▪ Franklin, Tennessee 37065 ▪ Phone: 615-790-9767 ▪ Facsimile: 615-790-9767 ▪ www.harpethriver.org

HARPETH RIVER
WATERSHED ASSOCIATION

Harpeth River Basin Water Quality Monitoring

I. Purpose

Establish continuous monitoring to provide much needed real-time data for new TMDL modeling and development of watershed-based implementation plans to reduce pollutant loads from all contributing sources so that the Harpeth River meets state water quality standards.

II. Brief Summary of Existing Conditions:

- EPA's nutrient enrichment and low dissolved oxygen TMDL for the Harpeth River established load allocations for non-point sources and wasteload allocations for point sources in 2004. The NPDES permits for sewage treatment plants were revised in 2010 to reflect the EPA TMDL's load allocations. Yet, dissolved oxygen data gathered during the summer low-flow conditions by TDEC and HRWA have continued to show levels below state standards for much of the length of the entire river, even after establishment of new, reduced permit limits. City of Franklin grab data from portions of the river flowing through the city recorded similar levels. Low dissolved oxygen levels occur in the headwaters, upstream and downstream of each sewage treatment plant discharges, and down river until the confluence with the South Harpeth and Turnbull Creek. (See map for sampling locations and major tributaries.)

- Low dissolved oxygen concentrations in the Harpeth River are occurring, even though NPDES sewage treatment plant current discharges, primarily Franklin's, are less than the allowed wasteload levels set by EPA's TMDL. For instance, the city of Franklin is not discharging at its permitted capacity and would contribute less than HALF of its TMDL wasteload allocation for BOD at its full 12 MGD design flow at its current low concentration for BOD. (See Oct. 2011 memo by CDM from the Integrated Water Resources Plan and pages 26-28 of attached powerpoint of HRWA's recent presentation at AWRA.) Yet, the Harpeth River dissolved oxygen levels are not at state standards. A new TMDL is needed and cannot be done without a more detailed, basin-wide monitoring protocol.

- Dissolved Oxygen Data Provided to TDEC: A compilation of data on dissolved oxygen, continuous or 24/hour, collected by EPA, TDEC, and HRWA is provided in an excel spread sheet that includes raw data. Also provided is the presentation on Dissolved Oxygen in the Harpeth prepared by HRWA at the spring 2012 AWRA conference. This includes all Dissolved Oxygen charts, flow data, and some of the analysis from the city of Franklin's Integrated Water Resources Plan. The City of Franklin has provided their grab sampling data to TDEC as well. TDEC also has grab sampling data for 2011, but neither this nor the city's datasets captured early morning conditions when dissolved oxygen concentrations are typically lowest. TDEC was unable in 2011 to participate in the HRWA 2011 monitoring, as it has in the past by setting out 2-3 continuous monitoring sites, because of equipment issues. More details can be found in the Franklin, Berry's Chapel and Cartwright Creek Utility NPDES permits, the comment section of which includes HRWA analysis and charts of dissolved oxygen data from monitoring efforts from 2008 and prior years.

III. <u>Conditions for all monitoring data:</u>

- All data must be made accessible via internet on at least a monthly basis. This enables easy access to the data for analysis and review and to assess watershed plan implementation, permit effectiveness, and other relevant watershed efforts.
- Data should be submitted along with monthly DMRs where relevant.
- Continuous data that coincides with USGS gages should be provided on the USGS web site.
- All data needs to be maintained and publically available at one central location such as a TDEC-maintained web page.
- Monitoring Plan and implementation should be established and managed by a public technical advisory group.

A. <u>Continuous Data Monitoring:</u>

The data needed can be divided into two groups, according to methods for collection that influence the schedule for data collection. Some parameters may be continuously and automatically collected by fixed instruments and remote data collection systems (similar to automatic meter readers):

- Dissolved Oxygen (DO)
- Total Suspended Solids (TSS)
- pH
- Temperature
- Conductivity

Flow data and climatic conditions should also be recorded from USGS/NOAA or other sources.

<u>Locations</u>: 6 on the mainstem and 1 on a tributary. See chart and map (Continuous monitoring sites are marked with a beaker symbol.)

B. <u>Grab Sampling</u>:

Some important parameters cannot be collected by remote methods, but must be collected by hand (grab samples) and processed by a lab. Also the sampling sites are in two groups based on the frequency of sampling. Group 2 require more frequent sampling and are at the continuous monitoring locations. Group 3 require less frequent sampling. See chart and map.

These parameters are:

- CBOD5

- BOD ultimate
- Ammonia-nitrogen
- Total Kjehldahl Nitrogen (TKN)
- Nitrate-Nitrite
- Ortho Phosphate
- Total Phosphate

Grab samples should also include the same parameters as the continuous data (listed again below). Grab samples should be taken with different equipment at the continuous monitoring sites to enable calibration of the continuous data.

- Dissolved Oxygen (DO)
- Total Suspended Solids (TSS)
- pH
- Temperature
- Conductivity

Locations and frequency of Grab Sampling:

Group 2:At the 7 continuous sampling sites (Water drop symbol)

Collection of grab samples should occur on a weekly basis May to October at selected sites and quarterly November-April (see map).

Group 3: 19 sites at confluences of major tributaries (Green "S" symbol on map)

Those sub-watershed basins feeding the Harpeth River should be sampled monthly May-October and quarterly November-April. A minimum of three sites for each basin should be sampled; 2 on the Harpeth River bracketing the confluence and 1 upstream in the tributary not too far from the confluence.

More sites should be considered, especially within some of the larger sub-watersheds that are listed on the 303(d) list if there is any indication of issues that need to be pinpointed or investigated further. Such sub-watersheds are likely to be Jones Creek, Turnbull Creek, South Harpeth, Flat Creek, West Harpeth, Little Harpeth, Spencer Creek, and Mays Creek.

C. *BODu* sampling of all NDPES outfalls on a quarterly basis by TDEC

- TDEC should sample each NPDES sewage treatment plant outfall once a quarter to provide BOD ultimate from each discharge. This is important for TMDL modeling.

IV. Responsible Parties for Funding the Monitoring Plan

- All of the stormwater and sewage treatment plant permitted sources need to be involved and share in the responsibility of funding and implementation.

- Other entities contributing pollutant load of a significant amount need to be responsible as well. This list below is not meant to be exhaustive, but rather to list all significant *permitted* sources. The list of responsible parties would adjust based on the monitoring data. For example, not every municipality in the watershed is on the list below. Thompson's Station, located in the headwaters of the West Harpeth, is growing with a 1 MGD non-discharging, deep-cell-lagoon sewer plant. Future monitoring in the West Harpeth might identify the town's growth as a source from a stormwater perspective. The town currently is not a Phase II MS4 permittee. Also, there are small permittees such as schools with small on-site sewer plants that are not included.

<u>NPDES permits for sewer plant discharges in the Harpeth River Watershed</u>

City of Franklin - (Also has an ARAP water withdrawal for drinking water that is relevant to mainstem water quality)
Berry's Chapel Utility (formerly Lynwood Utility District)
Cartwright Creek Utility
City of Kingston Springs
Town of White Bluff—discharges into Trace Creek in Dickson County
(collection system overflows are a possible cause for dissolved oxygen drop recorded at Harris Street bridge at downstream side of the Harpeth River State Park.)
Water Authority of Dickson County
City of Fairview- (Sewer plant now managed by Water Authority of Dickson County)
Harpeth Valley Utility District- sewer collection system in watershed (Bellevue)
Metro Nashville— collection system in Harpeth River Watershed
City of Brentwood- collection system
Town of Pegram—collection system and SOP for town sewer plant adjacent to Harpeth (non discharging)

<u>MS4 Phase I and Phase II permittees in the watershed</u>:
City of Franklin
Williamson County
City of Brentwood
Metro Nashville
City of Dickson

<u>Other:</u>
Town of Eagleville
(Known septic issues affecting water quality in the headwater region. The town is in the process of putting a non-discharging sewer plant in place).

V. **<u>Monitoring Site Locations and type of sampling</u>**. See table and maps.

The city of Franklin already has some monitoring in place in their jurisdiction and others on the list may have as well. These various locations can be provided and integrated with the monitoring sites provided below. The intent is for all the responsible parties to participate and to coordinate efforts to avoid duplication, to standardize monitoring, and to make the effort cost efficient.

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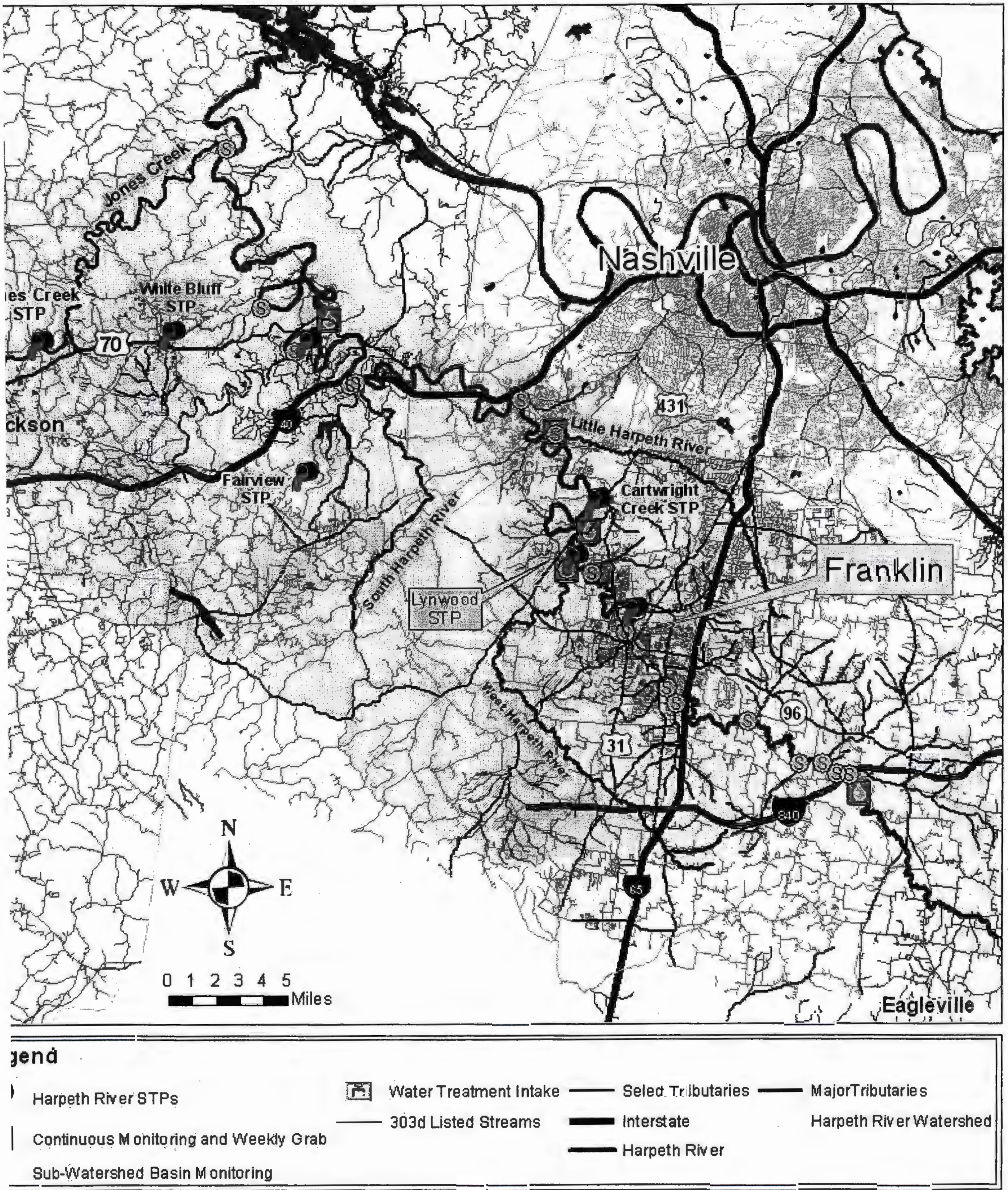
Other material included:

- Map of dissolved-oxygen monitoring sites of TDEC, HRWA, and city of Franklin.
- Map showing to location of the monitoring sites in the table.
- Excel spreadsheet of all continuous and 24/hour dissolved oxygen data.
- HRWA presentation at AWRA, April 2012, on Ten Years of Dissolved Oxygen monitoring on the Harpeth River.

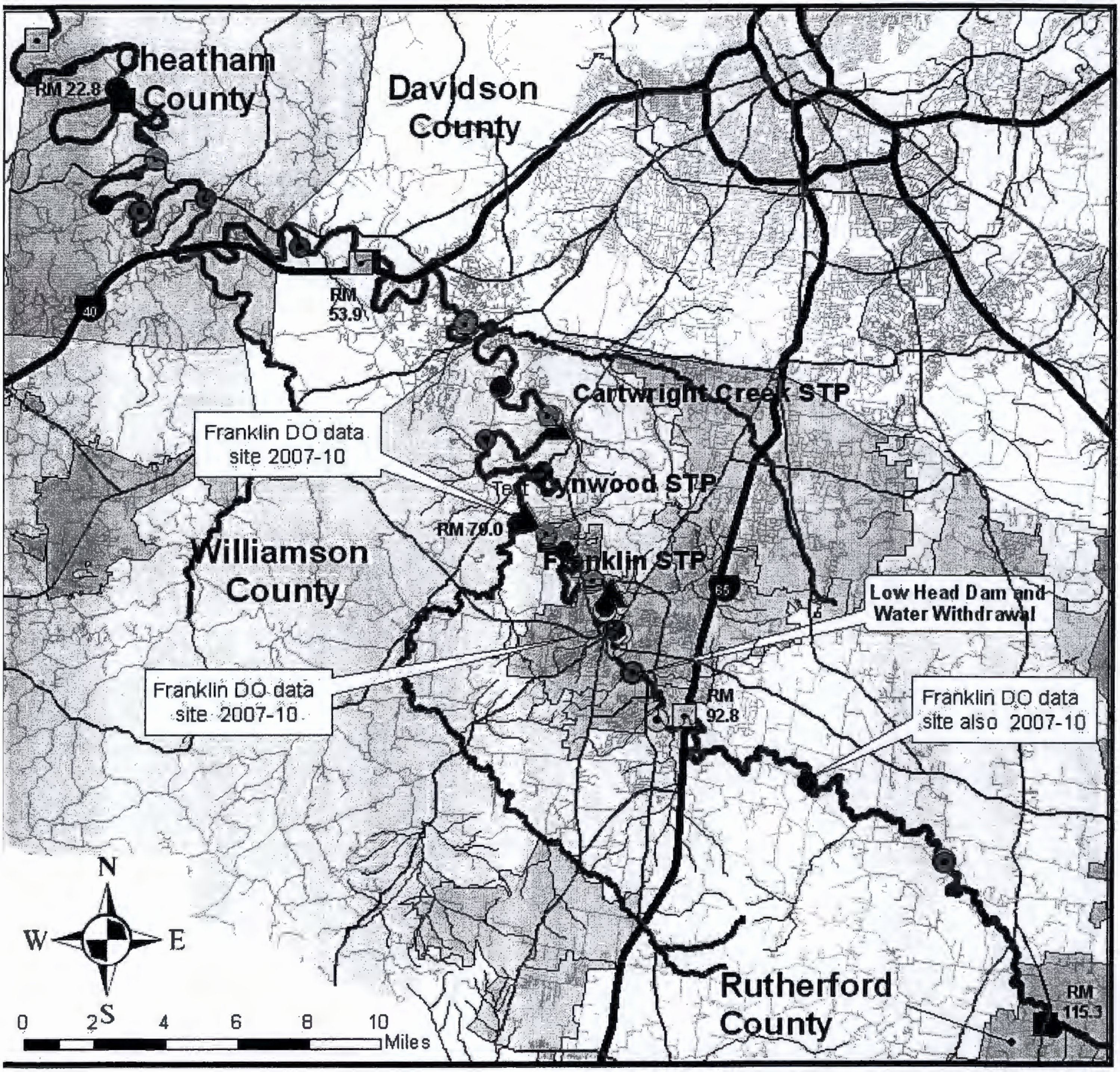
	Stream basin	monitoring Location	Harpeth River Mile	Continuous data	Grab samples	Sample type	Notes
1	**Harpeth River**	McDaniel Rd	107.2	x	x	2	Existing USGS gage
2	Nelson Creek	Cox Rd	106.0		x	3	
3	McClory Branch	McDaniel Rd	105.2		x	3	
4	Arrington Creek	Cox Rd	103.5		x	3	
5	Starnes Creek	Arno Rd	103.1		x	3	
6	Mayes Creek	North Chapel Rd	98.5		x	3	
7	Fivemile Creek	Ascot Lane	92.1		x	3	
8	Donelson Creek	Lewisburg Pike	91.2		x	3	
9	Watson Branch	Royal Oaks Court	89.6		x	3	
10	**Harpeth River**	TN 96, Pinkerton Park	88.5	x	x	2	Existing USGS gage
11	Sharpes Branch	US 431, Hillsboro Rd	87.1		x	3	
12	Spencer Creek	US 31, Franklin Rd	85.8		x	3	
13	**Harpeth River**	Cotton Rd	~~87.2~~	x ?	x	2	
14	Lynwood Branch	Gillette Dr	80.2		x	3	
15	West Harpeth River	Del Rio Pike	79.0		x	2	Need continuous gage flow data
16	**Harpeth River**	TN 46 (Old Hillsboro Rd)	75.3 74.9	x	x	2	
17	Cartwright Creek	Blue Springs Rd	68.6		x	3	
18	Little Harpeth River	Vaughn Rd	62.4		x	3	Need continuous gage flow data
19	**Harpeth River**	TN 100, Bellevue	62.3	x	x	2	Existing USGS gage
20	Flat Creek	Todd Pries Dr, Bellevue	58.3		x	3	
21	South Harpeth River	Anderson Rd	43.8		x	3	
22	Brush Creek	South Harpeth Rd	43.5		x	3	
23	Turnbull Creek	West Kingston Springs Rd	35.3		x	3	
24	**Harpeth River**	US 70 (TN 1), Shacklett	32.4	x	x	2	Existing USGS gage
25	Trace Creek	Trace Creek Rd	25.7		x	3	
26	Jones Creek	TN 47	10.3		x	3	maybe Timber Ridge or Pack Rd

larpeth River Basin Monitoring Locations

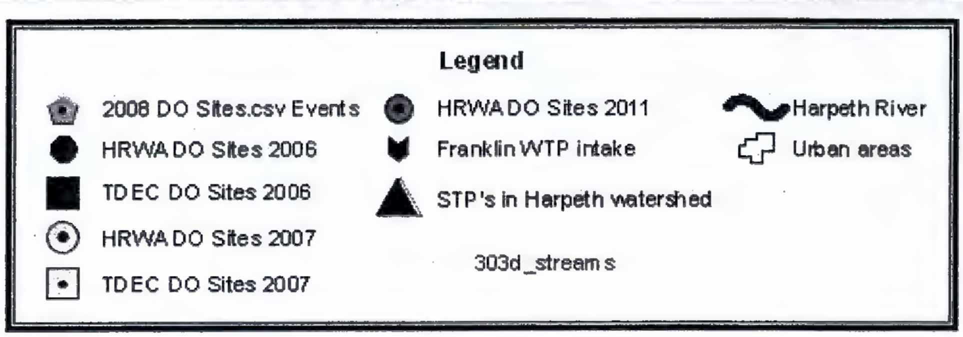


This map created for Harpeth River Watershed Association by M Cain using ESRI software and data from tngis.org and data gathered by HRWA staff.

Harpeth River Watershed Compiled Dissolved Oxygen Data Map, 2006-2011



This map created for Harpeth River Watershed Association by M Cain using ESRI softwareand data from tngis.org and data gathered by HRWA staff.



: DRAFT FOR REVIEW -- Tennessean Inquiry / Franklin Water and Sewer

ı Janjic

Wednesday, August 22, 2012 11:49 AM
Gary Davis

ıments: Following Up - Franklin (325 KB)

Janjic
ger, WPC Permit Section
532-0670
:cept and encourage electronic document submittals.

: Meg Lockhart
Wednesday, August 22, 2012 10:41 AM
ıey Holland; Sandra Dudley; Britton Dotson; Alan Schwendimann; Vojin Janjic; Saya Qualls
sha Calabrese; David Owenby; Shari Meghreblian; Chuck Head; Joseph Sanders
ıct: DRAFT FOR REVIEW -- Tennessean Inquiry / Franklin Water and Sewer

morning, Kevin Walters has inquired about the city of Franklin's plans to expand / upgrade its water and sewer plants in the years . He wants to get what he called "procedural" information from TDEC, including what kind of public hearings or clearances do we need vide? Can anyone at TDEC say how long the approvals for projects like this typically might take? I researched some older information e attached what we shared earlier this year. Not knowing if we have any updates from Franklin at this point or if some of the items noved ahead -- I drafted a response that might work for the time being. Feel free to add to this or offer any guidance on the ıse!

rched your inquiry regarding an update on the city of Franklin's plans to expand / upgrade its water and sewer plants. As I ned earlier this year, TDEC has been involved in various discussions with city officials over the years. Attached is a "scope of work" ent from 2009. This may be a bit dated as large projects such as this often do evolve. Based on information from the initial scope of lan, the city's project team will meet with the various state and federal agencies that may be required to review and approve the ary permits for the multiple projects they have proposed. Their plan also suggests that there will be several public participation and ınt opportunities for the community and local stakeholders. This would be in addition to the public protocol that comes with any elated permits.

: would be hard to speculate on timeframes, necessary permits and overall protocol without having specific applications in place, I t it might be helpful to provide you with some information in terms of what permits <u>might</u> come into play. Keep in mind that the city has various permits in place so some of the permits related to the city's new plan may involve newly issued permits, modifications to ı permits, etc. Again, it would be difficult to determine exactly what permits they will need without having the detailed applications : required. Here's a quick snapshot of various TDEC-related permits, along with links to each one. Kevin, at the bottom of each page ımary about how various permits are processed, including the procedural information you requested.

NPDES: http://www.tn.gov/environment/permits/npdes.shtml
ARAP: http://www.tn.gov/environment/permits/arap.shtml
WPC State Operating Permit: http://www.tn.gov/environment/permits/wqoperm.shtml
Construction Stormwater General Permit: http://www.tn.gov/environment/permits/conststrm.shtml
Water/Wastewater Operator Certification: http://www.tn.gov/environment/permits/opcert.shtml

his helps! Don't hesitate to let me know if you have follow-up questions.

re,

lowing Up - Franklin

ı Lockhart

: Wednesday, April 11, 2012 4:20 PM

Walters, Kevin [kwalters@tennessean.com]

:hments: CDM Revised Franklin IWRP ~1.pdf (311 KB)

ı, thanks for your patience. Our chief engineer discussed this with Franklin's consultants several years ago. Attached is a ıe of work" document from 2009. It is my understanding this plan was in the preliminary stages at that time. We have not 1 anything additional since that initial discussion.

told the Harpeth River cannot accept any additional pollutants without the city obtaining offsets from other es. Additionally, their master water plan will need to include several items that will require significant public input and 'ement. While the attached document is quite lengthy, you will find information that explains the city's need for a rehensive water plan, including some of the items that would need to be considered.

: this helps Kevin! Let me know if you need anything additional.

Walters, Kevin [mailto:kwalters@tennessean.com]

Wednesday, April 11, 2012 12:54 PM

:g Lockhart

:t: Franklin water, sewer question

eg.

› questions that I'm looking to get an answer for today about Franklin water and sewer.

klin's consultants have recommended that the city add a new sewer plant on the Harpeth River sometime in the next 30 years uld be upstream from the drinking water plant. Given the condition of the river being on the state impaired list what would the 'e to do to get regulatory approval to add more effluent to the river?

TDEC seen the consultants' plan do they plan to weigh in?

/alters

city government reporter

ınessean

771-5471

@Frkwriter

:
)bie Arnwine
:: Monday, August 13, 2012 7:57 AM
Gary Davis

',

specs page on the link you sent me was blank, but I found a copy of the user manual on line.
://www.microdaq.com/occ/documents/u26-dissolved-oxygen-usermanual.pdf
accuracy meets our requirements up to 8 mg/l but looses accuracy above 8 mg/l. Since our criterion is 5 (or 6 in trout waters) would be OK, but measurements over 8 should be flagged. The resolution is not quite as good (0.2 vs 0.1) but this is probably ptable as long as measurements on the cusp are viewed with caution.

:ally, these are not as good as the more expensive Hydrolab/YSI loggers but may be an acceptable low-cost alternative in some tions. (Especially if trying to ascertain location of DO sags).

ıldn't go overboard with these, until they are actually tried out in the field to check dependability, how well they hold ration and accuracy.

ıie

ı: Gary Davis
: Friday, August 10, 2012 9:49 AM
)ebbie Arnwine
ect:

ie

ır recent discussions - please xck the HOBO U26 (DO & temp) vs our SOP requirements - specs info

/www.onsetcomp.com/products/data-loggers/u26-001

ttees/others might be interested in using such units for Harpeth River, Memphis (Hurricane, Days, Nonconnah Cks & McKellar investigations.

s

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE ENVIRONMENTAL FIELD OFFICE
711 R. S. GASS BOULEVARD
NASHVILLE, TENNESSEE 37243
PHONE (615) 687-7000 STATEWIDE 1-888-891-8332 FAX (615) 687-7078

August 22, 2012

Mr. Mark Hilty, Director
Franklin Water Management Department
P.O. Box 305
Franklin, Tennessee 37065

Re: Compliance Biomonitoring Inspection
Franklin Sewage Treatment Plant
NPDES Permit No. TN0028827
Williamson County

Dear Mr. Hilty,

On June 17-22, 2012, Water Pollution Control (WPC) personnel Jimmy Smith, Chase Lyles and myself conducted a Compliance Biomonitoring Inspection (CBI) of the Franklin Sewage Treatment Plant (STP). A CBI is performed to review compliance with the NPDES permit with particular emphasis on the biomonitoring requirements, and to help resolve any problems or questions that may arise. As part of the CBI, chronic toxicity tests were performed through the Aquatic Biology section at the State Department of Health's Nashville Central Laboratory (TDH Lab) on effluent samples from the Franklin STP. My observations and comments are as follows:

A portable automatic composite sampler was set up by WPC personnel near the Franklin STP effluent sampler at Outfall 001 on Sunday morning, June 17, 2012, and removed Friday morning, June 22, 2012. Three 24-hour composite samples of effluent (June 18, 20 and 22) were collected and delivered to the TDH Lab by personnel in this office. Chronic toxicity testing was conducted on two test species using a series of effluent dilutions, per methodology specified in the Franklin STP's NPDES permit. A copy of the TDH Lab report is attached.

As the report indicates, the Fathead Minnows (*Pimephales promelas*) showed no acute or chronic toxicity up through 100% effluent, the maximum effluent dilution tested (the IC25 permit limit is >100%).

The water fleas (*Ceriodaphnia dubia*) showed no acute or chronic toxicity up through 100% effluent, the maximum effluent dilution tested (the IC25 permit limit is >100%). Therefore the Franklin STP was found to be within compliance with their NPDES permit limits.

During the Compliance Evaluation Inspection (CEI) conducted June 23 and 24, 2011, it was noted that the samples were being collected by time composite rather than the required flow proportional composite. This has since been corrected.

A significant difference in the influent flow and the combined effluent and reuse flows was also noted during that CEI. During the past year, the average influent flow was from 1.3 to 2.4 MGD greater than the combined effluent and reuse water flows. This was discussed with Mr. Davis. He indicated that a significant volume of plant water (from before effluent flow measurement) is used in the sludge processing building and in backwashing the Tetra filters and returned to the main pump station upstream of influent flow measurement. This should be further investigated to determine if this is the source of the flow difference. Any other in plant water uses that could influence these flow readings should also be investigated.

Otherwise, the Franklin STP's own effluent sampling location, equipment, and methodology all appeared to be satisfactory.

This concludes my inspection observations and comments. I wish to express our appreciation to Juan Davis, Wayne Davenport and the other plant personnel, for their courtesy and assistance with this inspection. If you have any questions, or if I can be of further assistance, please contact me by phone at 615/687-7127 or by e-mail at *Mike.Thornton@tn.gov*.

Sincerely,

Michael R. Thornton
Division of Water Pollution Control

cc: Juan Davis, Franklin WWTP

DATE: 6/19/2012

TO: Jimmy R. Smith, NEFO/WPC/TDEC
FROM: Marks E. Smith, Aquatic Biology/Environmental Laboratory/TDH

SUBJECT: Chronic *Pimephales promelas* 7-day larval survival and growth test, Franklin STP, Outfall 001

Location:
County: Williamson
NPDES No: TN0028827
Lab Log No: N00009268001Pp

Test Dates: June 19 - 26, 2012

Participants:
Principle investigator: Marka E. Smith, Aquatic Biology/ Environmental Lab/ TDH
Test performed by: (ESC) personnel
Field collection: Jimmy R. Smith, Chase Lyles and Mike Thornton, NEFO/WPC/TDEC

Effluent:
Number of samples: Three 24-hr composite samples of final effluent
Legal tag received with samples? Yes
Sample collection dates: 06/18, 06/20, and 06/22/2012

Dilution Source:
Lab water: 20% dilute mineral water

Food:
Type: *Artemia nauplii*
Quantity: 0.15-0.20 mL, twice daily

Test Conditions:
Vessels: 600 mL plastic cups/350 mL test volume
Incubator temperature range: 25.0 °C ± 1°C
Photoperiod: 16 hr light, 8 hr darkness

Chronic permit requirements and test results:

Permit End Point: Survival [a]IC25 = 100%
Permit End Point: Growth IC25 = 100%

Survival Test Result: [b]N.C.T. >100%
Growth Test Result: N.C.T. >100%
Growth PMSD[c]= 19.0%

[a] IC25 = The effluent concentration at which a 25% inhibition of growth occurred
[b] N.C.T.=No Chronic Toxicity
[c]PMSD=Percent Minimum Significant difference calculated for sublethal endpoints

Test Review

SUBJECT: Chronic *Pimephales promelas* 7-day larval survival and growth test, Franklin STP, Outfall 001

Sampling and Handling

Effluent samples were collected by TDEC/WPC personnel and delivered to the environmental laboratory on Monday, Wednesday and Friday of the test week. The samples were then delivered to ESC lab Sciences after being received by TDH personnel. The chain of custody with each sample was completed. Each sample had first use in less than 36 hr.

Test Acceptability Criteria

All 40 of the control organisms survived. They had an average weight of 0.4508 mg.

Test Conditions

Test procedures for chronic test were followed in accordance with EPA guidelines (EPA-821-R-02-013, October 2002), the TN Environmental Laboratories Standard Operating Procedures Manual 2007, and NPDES permit No. TN0028827.

Statistical Methods

Statistic used (IC25) was specified by the permit.

Concentration-Response Relationship

There was no toxicity present in this test. Therefore, there is no valid comparison between the results of this test and the concentration-response relationship graphs in the EPA-821-B-00-004 July 2000 publication.

Reference Toxicity Test

A June 2012, Pimephales KCl standard toxicant test was performed with the effluent test using the same batch of test organisms. IC25 survival and growth endpoints were within +/- 2 standard deviations of the cumulative mean of the previous reference tests performed by ESC Lab Sciences indicating a normal sensitivity.

: Franklin biomonitoring report

ɜ Thornton

Thursday, August 23, 2012 8:36 AM

Gary Davis

hments: 2012 chronic cd report.pdf (132 KB) ; 2012 chronic pp report.pdf (72 KB) ; cbi12.pdf (423 KB)

ı: Mike Thornton

: Wednesday, August 22, 2012 3:45 PM

nark.hilty@franklintn.gov'

uand@franklintn.gov'; Jimmy R. Smith; Ann Rochelle

ect: Franklin biomonitoring report

hed is a copy of my CBI letter for this facility.

ıriginal was also sent via the US mail.

ıe know if there are any questions.

:s

'127

ıthic data on Harpeth from permittees

ie Bolze [doriebolze@harpethriver.org]

: Thursday, August 23, 2012 4:52 PM

Gary Davis

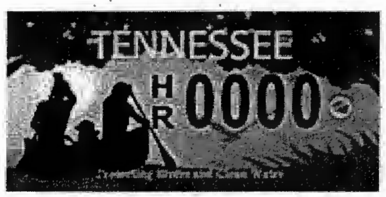
Marina Metes [marinametes@harpethriver.org]

ary,

oyed our conversation today. I already started our new VISTA volunteer on pulling together the benthic data that has been ered by various projects and entities over the years on the Harpeth. Marina Metes will likely want to come down to TDEC and ɔ find copies of all of the benthic study reports that the city of Franklin has done under its sewer permit. We also have the hic studies that the city has been doing with the stormwater program. Very interesting! Also, did you know there is benthic from the feasibility study done by the city re the lowhead dam removal?

d I receive a copy of the compilation you mentioned having pulled togheter of the benthic data you have already. Maybe we ıelp add to it with this other studies.

ks!



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Permittee's Instream BioSurveys Results

Sta		9/11/2001	9/10/2002	9/2/2003	9/1/2004	9/7/2005	9/6/2006	9/21/2007	9/3/2008	10/1/2009	8/23/2010	9/23/2011
1	RM 85.4 (Upstream of Outfall 001 @ RM 85.2)											
	Total Taxa	27	25	20	22	18	24	23	27	33	24	32
	EPT Taxa	6	6	4	6	5	7	9	8	9	6	7
	% OC	45.0	25.0	87.1	60.3	14.0	22.2	7.1	37.1	21.8	15.4	64.5
	% EPT	27.0	27.0	6.7	21.6	8.8	16.8	23.9	29.5	9.2	16.4	26.4
	NCBI	5.65	5.63	6.80	5.57	5.23	5.37	5.00	5.24	5.20	5.22	5.53
	% Dominant	22.0	39.0	64.5	31.4	74.0	52.2					
	% Nut-Tol							87.3	61.6	74.8	68.7	37.6
	% Cling	69.0	64.0	45.9	43.9	82.8	68.0	79.2	15.2	73.3	57.4	25.9
	TMI	28	28	14	24	22	26	26	20	28	24	24
2	RM 85.2 (Downstream of Outfall 001 @ RM 85.2)											
	Total Taxa	20	22	19	23	23	24	18	22	23	25	36
	EPT Taxa	5	5	6	8	8	6	6	7	5	6	3
	% OC	31.0	27.0	68.8	64.7	12.3	13.4	4.5	16.8	49.6	33.8	50.9
	% EPT	38.0	36.0	26.7	19.2	6.9	15.9	7.7	20.0	10.8	16.9	12.3
	NCBI	5.50	5.70	6.02	5.51	5.19	5.08	4.82	4.33	5.40	5.35	6.43
	% Dominant	25.0	26.0	51.3	26.4	76.9	49.4					
	% Nut-Tol							91.4	70.5	47.1	59.4	36.8
	% Cling	68.0	52.0	72.9	32.2	79.3	67.4	77.8	9.1	40.4	48.8	12.9
	TMI	30	30	22	24	26	26	20	24	22	20	20
3	RM 85.1 (Downstream of Outfall 001 @ RM 85.2)											
	Total Taxa	25	25	21	24	19	25	21	22	33	22	27
	EPT Taxa *	5	7	6	7	5	4	3	5	7	5	7
	% OC	25.0	23.0	65.2	49.0	11.1	10.2	14.1	22.8	32.1	25.4	61.8
	% EPT	38.0	24.0	25.8	13.6	9.4	7.2	6.1	19.7	11.7	11.9	7.5
	NCBI	5.65	5.55	6.14	5.28	5.27	4.90	4.92	4.91	5.10	5.59	5.08
	% Dominant	24.0	35.0	41.2	26.2	69.1	53.8					
	% Nut-Tol							82.2	70.0	73.3	53.5	28.1
	% Cling	62.0	48.0	61.4	43.4	73.5	65.3	61.0	7.3	60.8	52.4	29.6
	TMI	32	30	24	26	22	26	20	20	26	24	24

ınklin STP TN0028827 Working Draft Bio Results

y Davis

: Friday, August 24, 2012 7:56 AM

Dorie Bolze [doriebolze@harpethriver.org]

:hments: TN0028827 - Working Draft ~1.xls (107 KB)

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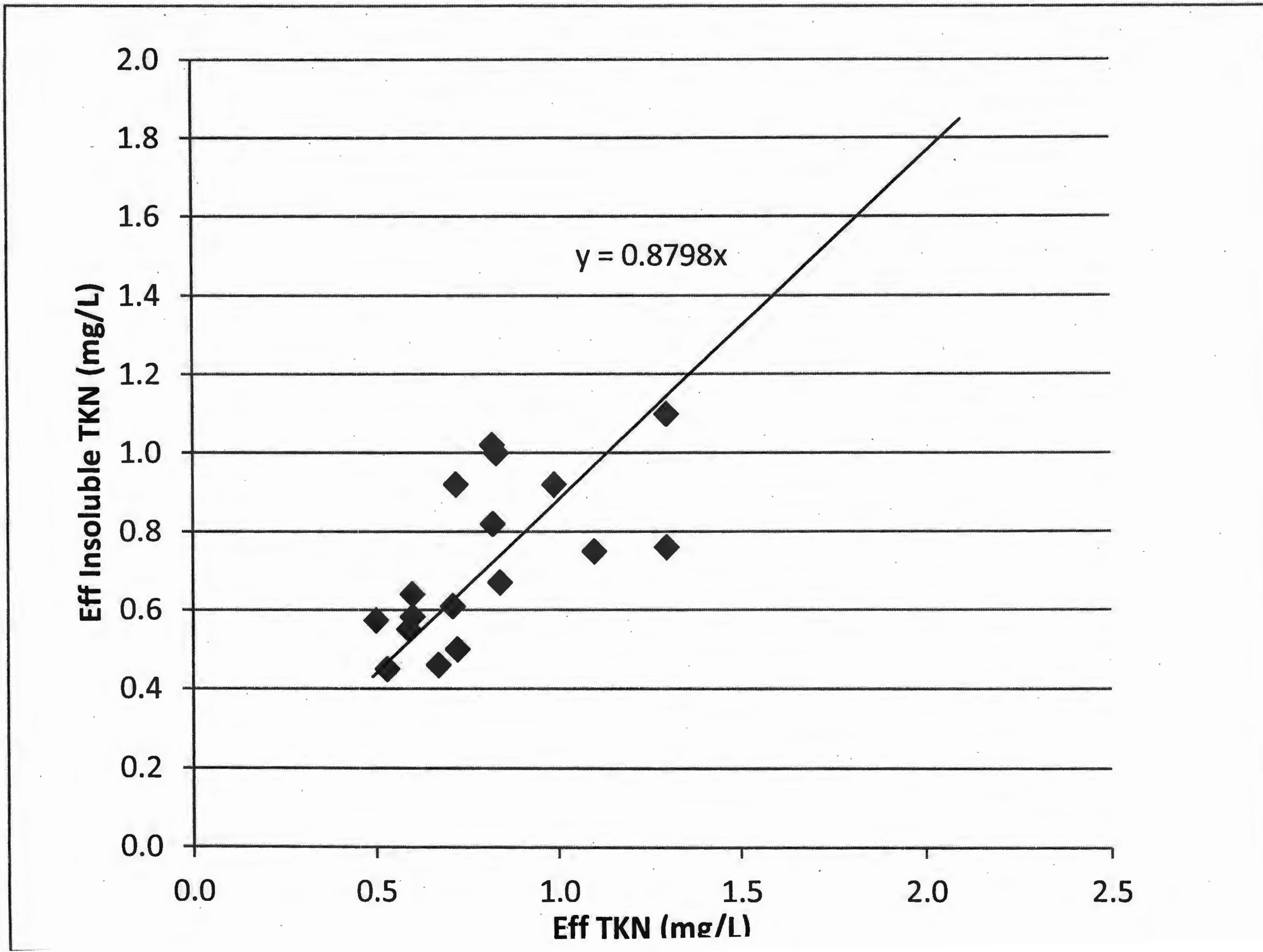
ʼour yesterday's email request I've attached the working draft bio results.

ıks

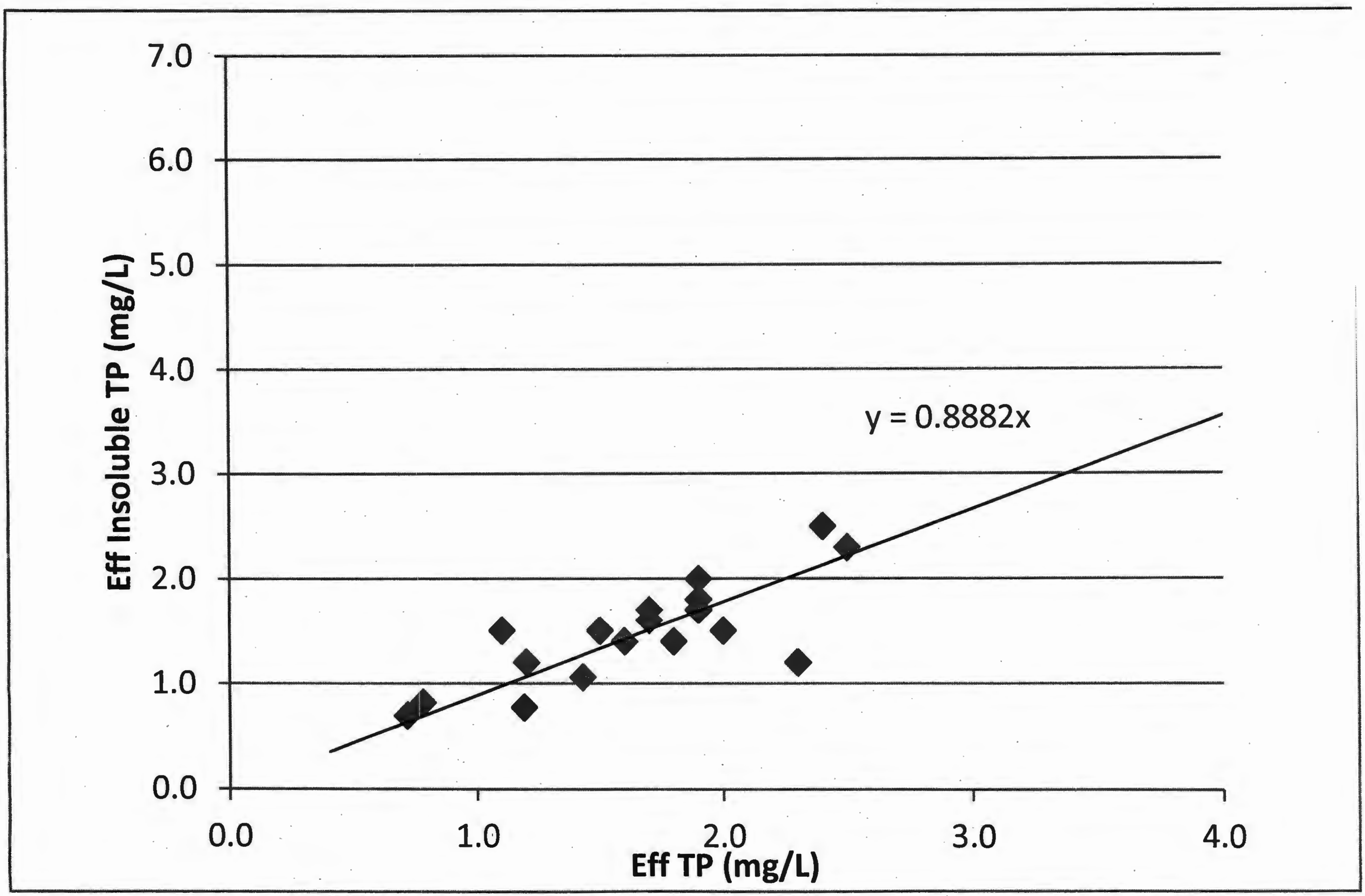
Davis

: - Div. of Water Resources

;32-0649



2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Eff Insoluble TKN (mg/L)
y = 0.8798x
0.0
0.5
1.0
1.5
2.0
2.5
Eff TKN (mg/L)


Eff Insoluble TP (mg/L)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.0
1.0
2.0
3.0
4.0
Eff TP (mg/L)
y = 0.8882x